Management of Information Centres in China

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Management of Information Centres in China:

Results of a course held in Kunming, Yunnan Province, People's Republic of China, 6–18 December 1982

Editor: K.P. Broadbent

Sponsored by: The International Development Research Centre, Canada, and
The Institute of Scientific and Technical Information of China

Editorial Note

It should be noted that some of the lectures that formed a part of this course were provided all or in part in audiovisual form and, therefore, could not be reproduced in this report. Some figures and tables that appeared in the lectures were also presented as overheads in the Chinese language and could not be included. The following lectures that were given are not included in the report:

1. Problems of Data and Measurements
2. The Quality of Information
3. Information Systems Development
4. Application of New Technology
5. Quantitative Methods to Information Centre Management

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FOREWORD

This course may be defined as an informal seminar in a specialized field, namely the management of information centres in China. The course was not about China's experience as such, although participants were invited to give an account of their experiences, rather, it was based on various experiences in the management of information centres that might be of help to China in planning and organizing their own centres.

It was agreed that a learning event of this kind should attempt to meet individual needs: course content should be relevant to the participants' own work, and participants should share their experiences and help design the course. The curriculum was therefore designed to be flexible and not as a fixed entity with which participants had to contend. A series of surveys and questionnaires at the beginning and end of the course identified the goals, interests and needs of the participants and their feelings about the course. This feedback underscored the course's weaknesses and highlighted areas for further discussion.

In general, an effort was made to encourage communication among participants and lecturers, maintain a sense of purpose and direction, and to afford everyone an opportunity to criticize and evaluate the program for future use. The course proceeded from a discussion of the general principles of information science to case studies and practical examples of management in large and small settings. Consideration was given to the many practical concerns voiced today by those involved in the transfer of information and in the application of new technologies.

This report is offered not as a model for future courses in similar settings, but simply as a means for promoting and stimulating knowledge in this field. It is hoped that in some small way the course will contribute to China's modernization program and will help information scientists in China to increase their skills in order to attain greater self-sufficiency in information services. The creation and build-up of modern information services is a prerequisite for social and economic development. It is therefore hoped that the diffusion of skills in this area will ultimately be of widespread benefit to the Chinese people.

Martha B. Stone
Director, Information Sciences Division
International Development Research Centre

Part One

General Background and Introduction to the Course

THE COURSE

BACKGROUND

The course evolved from one of the proposals submitted to the International Development Research Centre (IDRC) during the first visit to China by IDRC officers in September 1980. It was sponsored by the Institute of Scientific and Technical Information of China (ISTIC), the origins of which date back to 1956 when its predecessor was established by the Chinese Academy of Sciences (CAS). ISTIC was given its present designation in 1958 and comes under the aegis of the State Scientific and Technology Commission (SSTC). In this key position with SSTC, ISTIC is able to develop a large program of information throughout China, with branches and contacts in every province and autonomous region, and also plays a key part in policy formulation in China. Located within ISTIC are the Secretariats of the Chinese Society of Scientific and Technical Information and the Chinese National Technical Committee on Standardization in Documentation (corresponding to the technical committee dealing with documentation at the International Organization for Standardization (ISO)). Important developments in China since the mid-1970s have led to the demand for more efficient information services to aid industry, agriculture, research and development, and defence. Events within China during the previous period were characterized by a low-key approach to the processing of information. This course, therefore, was seen as one of a series of stages to bring information scientists up to date on methods of handling information that, in most instances, have come to be regarded as commonplace outside of China.

OBJECTIVES OF THE COURSE

The main objective of this course was to strengthen China's capacity to provide information services in the scientific and technical field by instructing senior administrators in modern, practical management methods. It aimed specifically to:

- Provide participants with enough fundamental knowledge of modern information procedures to help improve their work and pass their experience on to others;
- Increase the ability of participants to grasp the principles of scientific management;
- Provide greater awareness of developments outside China in the sphere of information management;
- Improve decision-making; and
- Provide a basis for further training.

COURSE PLANNING

Great efforts were made to fulfill China's request to conduct the course entirely in Chinese, thus obviating the necessity for simultaneous interpretation. But finding lecturers who could both handle the subjects in the general curriculum and speak Putonghua (national language) proved to be extremely difficult: many suitable candidates in Taiwan had to be excluded for obvious reasons, and several Chinese in Singapore and Hong Kong who were conversant in the subject matter either did not speak or write Chinese or spoke a dialect other than Putonghua, such as Cantonese.

Because subsequent correspondence from and visits by Chinese officials revealed a desire to increase the Canadian content of the course, an attempt was made to involve the Canada Institute of Scientific and Technical Information (CISTI). Although it was difficult to obtain the services of CISTI personnel, CISTI went out of its way to provide audiovisuals and other useful materials, as well as follow-up lectures in China by the Director in late 1983.

Finally, we were able to select two good Chinese speakers, backed up by the course administrator, who also was fluent in Chinese. Two other non-Chinese speakers were assisted by ISTIC staff and the Chinese-speaking lecturers.

ISTIC chose the major topics which formed the basis of the curriculum of the course. A representative of ISTIC attended a 2-day planning meeting held in Ottawa 15-16 June 1981. This meeting dealt with general logistics and basic curriculum planning, and confirmed ISTIC's contribution. A further meeting took place on 16 February 1982. Those who attended planned the timetable in broad outline and looked at areas of concern (Fig. 1). A final meeting took place in Hong Kong on 5 December 1982. Meanwhile, individual lecturers drew up detailed lectures on assigned topics and presented synopses to be vetted by ISTIC before the course began. The broad subject areas covered were:

- Function, planning and management of information centres,
- Budgetary and fiscal control,
- Facility planning and administration,
- Improving bibliographic services,
- Systems analysis and design,
- Information technology,
- Sources of information, and
- Personnel development and performance evaluation.

In order to guarantee delivery of the course, it was necessary to supply a variety of audiovisual equipment and reprographic facilities. These items were consigned to ISTIC in advance and donated to them at the end of the course; normal backup services and administrative support were provided by ISTIC.

COURSE DETAIL

The course was scheduled to take place in

Kunming, Yunnan Province, 6-18 December 1982. Attending the course were some 65 participants - senior administrators from different information institutions throughout China, about 16 members of ISTIC as well as local participants, the number of which varied each day. On any one day, we could expect to lecture to approximately 75 people.

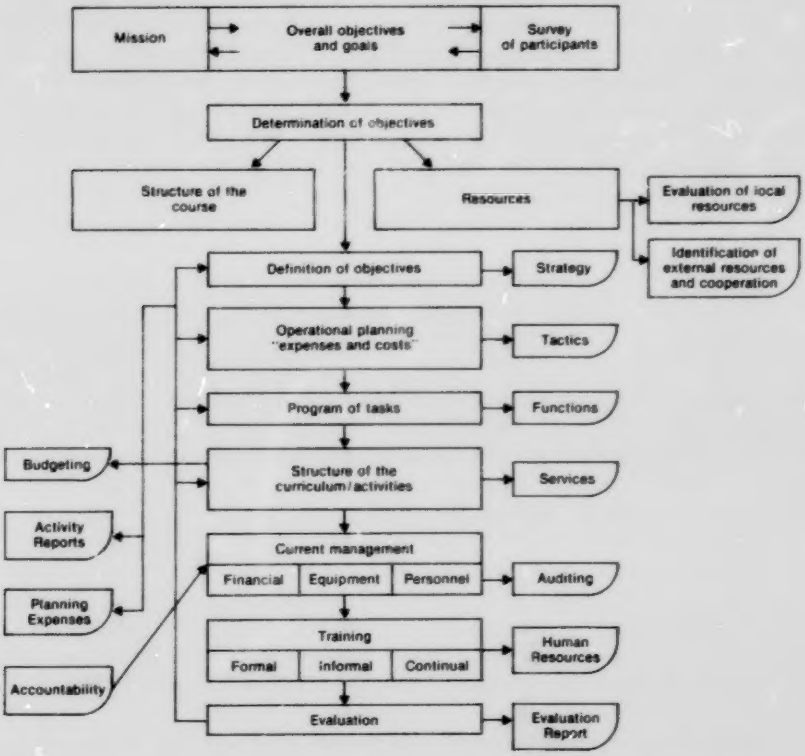
Mission
Overall objectives and goals
Survey of participants
Determination of objectives
Structure of the course
Resources
Evaluation of local resources
Identification of external resources and cooperation
Definition of objectives
Strategy
Operational planning "expenses and costs"
Tactics
Program of tasks
Functions
Budgeting
Structure of the curriculum/activities
Services
Activity Reports
Current management
Financial
Equipment
Personnel
Auditing
Planning Expenses
Training
Formal
Informal
Continual
Human Resources
Accountability
Evaluation
Evaluation Report

Fig. 1. Schematic outline of management of information centres in China.

In the evenings, there were group sessions which focused on more specific items or provided additional explanations of the day's topics. (See Appendix 1 for the final timetable.) During the course two surveys were conducted - one to ascertain the participants' interests and the other their institutional background.

At the end of the course, an evaluation was conducted and open discussion took place between lecturers and all participants. In general, the participants felt that the course had been successfully conducted, and that the curriculum had satisfied their needs. Information about developments in other parts of the world were of particular interest to them. (Although in the West information services were part of library services or specialized institutions, this was not the case in China. There, the development of scientific and technical information was centralized and independent of library development.) The actual day-to-day management procedures, especially concerning planning, budgeting and personnel, were judged to be most valuable.

The time allotted for the course was 10 working days. This was considerably less than the course length originally requested by ISTIC, but was judged as the optimum time by the lecturers. ISTIC would have liked a 3-week course, but it is doubtful if more material could have been included in the curriculum without expanding the teaching staff. During the course it was found that the variety of the participants' backgrounds limited the speed of assimilation of the information: it was therefore unlikely that extra hours of more detailed subjects would have been beneficial.

NATIONAL PERSPECTIVE AND IMPLICATIONS FOR INFORMATION PROCESSING

To try to put the information requirements of China in perspective requires some explanation of the special circumstances existing in China. The Kunming course provided a good opportunity to get a close look at the enormous problems existing in information services in China at the present time.

China is a country that has undergone rapid radical change in the past 30 years, both in public and private life. In February 1982, the Chinese leadership began to restructure the State Council, various ministries and institutions, and reduce the number of personnel. In a way, the Chinese are trying to reduce their enormous bureaucracy and improve the administration that runs the country. "Management" is a term that provokes much discussion and the course we ran in

Kunming focused a great deal on how to improve basic management. ISTIC, for instance, is concerned about its inability to organize its operations efficiently, make the best use of staff and acquire modern methods of handling information.

In China, as in many other countries, administrative reforms are more easily proclaimed than implemented. Nevertheless, a major effort is under way to make their "system", as we can loosely call it, more effective. A long and tiring campaign will be necessary to reorganize the STI field and to make it resemble the models the Chinese admire most, i.e., CISTI. The concept of a "user" is still not understood in its basic sense.

When we conducted the course in Kunming we had an opportunity to see exactly how institutions are working, battling against tremendous odds to serve the information-starved scientist and student. Only by close interaction with the senior administrators for a period of 2 weeks were we able to question each other, and to comprehend the gigantic nature of the reform effort and the extent to which the present problems are the consequence of deep wounds caused by the 10 years of turmoil during the Cultural Revolution (1966-76) and the aftermath of the death of Mao Zedong.

During the period of the Cultural Revolution, there were lapses in education at all levels, and in scientific research, the training of professionals fell to a low level. Since then, China has outlined 108 key projects in 27 spheres of which the following scientific and technological areas are to receive top priority: agriculture, energy, space technology, materials, lasers, computers, high-energy physics and genetic engineering. Research will be strengthened by a force of 800,000 research workers in existing and newly created institutes. To lay the foundation for this development, China has adopted a 12-point program. The most relevant points of this program are:

- To reestablish the State Commission for Science and Technology to take charge of science policy;

- To increase state funding;

- To promote greater international scientific cooperation and exchange of information;

- To encourage scientists to spend five-sixths of their working time on scientific and technical information; and

- To compile new science texts and set up scientific information centres.

The government is showing great enthusiasm in acquiring scientific and technical information after 10 years of being denied access to world literature. China has traditionally revered science; but the recent emphasis on science and technology has brought forth a demand for information so overwhelming that the present library system cannot handle it. To do so will require a massive effort and radical change in the existing management of information services.

For a population of almost one billion, there are only 30 general libraries; academic libraries suffered badly during the Cultural Revolution. The largest library is the Beijing Library, which can be considered the National Library. Although it is still housed in buildings built in 1931, it will probably soon move to larger premises. Relocation is essential due to the fact that its book stock has increased from 1.4 million in 1949 to over 9.5 million in 1978. English, Japanese, Russian and Arabic are the predominant languages; of the 10,000 periodicals which the library receives, 8000 are in English. It is, however, a deposit and reference library which provides no public lending services.

China's second largest library, the Shanghai Library is made up of a collection of smaller libraries. It is more of a public library, although access is restricted to ticket holders. Its stock of 6.5 million books covers broader subject areas than Beijing's, including social sciences and politics as well as science and technology.

During the decade of neglect, many of the 70 or so research institutes run by the Chinese Academy of Sciences were badly affected, as were their affiliated libraries.

With the recent emphasis on research and the establishment of new research institutes and academic facilities, the demand for backup scientific and technical information will inevitably increase. However, the acquisition and use of foreign scientific and technical publications and reference works could pose several basic problems to Chinese libraries. These involve copyright and payment, as well as translation and reproduction. As China has no copyright tradition, these matters will have to be clarified; at present overtures are being made by various foreign publishing companies.

It is apparent that the full potential of scientific and technical developments in China has not yet been achieved: this offers considerable scope for the development of research libraries. In the current climate of change, Chinese authorities wish to benefit from the experience of research librarians in the Western World in order to build up their library infrastructure and systems from the present low base.

It is within this context that this course on the management of information systems came into being.

Yunnan Province was chosen as the site for the course for several reasons: to decentralize such activities from Beijing; to attract more local attention, and boost local morale and prestige (because much was made of our visit by the local and national media); and to provide a pleasant climate in winter. The fact that Kunming is a well-known tourist spot for the Chinese was an added attraction for the participants.

Local information needs in the scientific and technical field are served by a smaller version of ISTIC - the Institute of Scientific and Technical Information for Yunnan (ISTIY). The course offered a 1-day case study at ISTIY, which provided us with a particularly good example of how information services are designed to operate in China. ISTIY had just been given a new building in Kunming. Although as an information institution, it has special spatial and equipment requirements, this building was a standard, multistoried concrete block. The information staff appeared to have had no say in its design, or if they did their advice was ignored. Consequently, space was difficult to organize and, right from the start, there was no opportunity for the building to operate as this type of institution should. There was also a lack of current material, and the reference collection was not up to date. A quick glance at the mailroom seemed to indicate a backlog of periodicals.

ISTIC in Beijing is putting up a valiant effort to combat this situation. As the top-level information institution in China, it has considerable influence on the State Commissions and Ministries. It is the main source of information on scientific and technical data, patents, translations of important foreign documents, etc. It processes many documents and arranges for their circulation throughout the country - which in practice only includes the immediate area around the capital. Each province has its own "mini-ISTIC", as it were, but judging by the Yunnan experience, the impact of these is probably very small on local users of information. ISTIC has an office in Chongqing in Sichuan Province, in addition to the provincial institutes of scientific and technical information.

Our overwhelming first impression of senior managers was that they were intelligent, articulate and experienced bureaucrats. From our survey of their backgrounds, it was possible to discern the general structure of their institutions. Most seemed to be imbued with a sense of purpose, but were aware of obstacles and reluctant to try to alter circumstances; they clearly understood the rationale for current practices. Most were in their mid-50s and had served in their area of expertise for 25 years or more (since the mid-1950s), with a 4- to 10-year enforced absence under varying degrees of duress during the Cultural Revolution. They all seemed to be well aware that knowledge is vital to development. While information institutions tended to be open in identifying their personnel, the tendency was quite the reverse for the participants when describing their responsibilities. Lectures that drew a lot of attention and comment from them were those on job descriptions and performance evaluation - the latter probably because a system of scoring for different tasks relates to the work-point system commonly used in China.

One of China's most serious problems at the present time, which greatly limits effective planning, is the lack of access to reliable and timely information in all fields. There is little understanding of user needs or services, and any attempt to alleviate this problem is constrained by a shortage of trained staff.

Training of information managers is a basic task in China. At present, the need for more information on scientific and technical matters is very pressing and China lacks adequate human resources to meet these needs. Therefore good planning is needed to support scientific development. Provincial surveys and studies are required in order to ascertain basic needs for information. There is not only a lack of skills but also a lack of teachers of information science. Although both informal and formal training is available abroad, ultimately China must look to her own resources to build up a strong caucus of teachers and encourage the development of good students. A lack of good teaching materials and of good basic equipment to run information services in libraries and information centres also hinders progress.

Because few librarians have been trained in Chinese educational institutions in the past 15 years or so, most bureaus are unable to operate effectively or to handle the increasing demands for information. Consequently, most Chinese have no concept of the modern information-processing methods in countries outside China: most participants on the Kunming course, for example, had never used a photocopier. But the post-Cultural Revolution era, which now allows greater access to foreign developments, has had some curious anomalies. For instance, although ISTIY in Kunming had few books, it did have a brand-new video system donated by the Japanese.

The possibilities of mechanization are poor. Both the quantity and scale of computers is limited. At universities, for example, most computers are used for scientific applications and the capacity for information work is insufficient. There is a shortage of terminals for students' use and software is limited - even Cobol cannot be used. And information work in the Chinese language presents an additional problem because computers cannot store and retrieve Chinese characters. There is a great need for minicomputers for use exclusively in a library/information role. Most computers being used in information work are located in centres such as Beijing or Shanghai, so that application in locations such as Yunnan is inadequate. Library science students are often trained using foreign texts. Consequently, some students, as we found on this course, may be familiar with computers but have had no practical experience with them. The same situation pertains to document delivery. Very little use is made of modern equipment such as microfiche or even photocopiers, and maintenance of foreign equipment is always a problem.

All this has an adverse effect on any instructional course on basic information science theory because students cannot be offered the practical application of theory, nor can they go to advanced centres where modern methods of information management are in use. There is also a lack of attention to standards and the compatibility of systems, for instance, in information processing. The standards of the International Organization for Standardization (ISO) are not adhered to: this makes the retrieval of information difficult because, in many cases, internal coding schemes for Chinese character processing are not compatible with the proposed ISO standard for Chinese character codes.

In trying to improve its information centres, China must seek to improve the teaching of information science at both the graduate and postgraduate level, and to emphasize the training of trainers. Present numbers are inadequate for meeting China's needs: for some time China will have to augment its staffs with foreign teachers, provide more courses like this one, develop fellowships abroad for appropriate students, as well as build up its stocks of reference materials and texts.

An up-and-coming group of young professionals is now valiantly struggling to surmount these problems. In such areas as abstracting and indexing, they are trying to contend with an ever-increasing body of national literature - a situation radically different from the period before and during the Cultural Revolution, when authorship was restricted and the flow of information was therefore slow. Now, every area is blossoming with new titles, and new periodicals appear daily. During the course, for example, the ISTIC representative presented us with the first edition of a new journal of information science.

LESSONS LEARNED

The problems involved in organizing and running a course of this type are potentially enormous, but can be obviated by thorough planning and preparation, and faith in the recipient organization's ability to coordinate its share of the responsibility. The problems encountered fall into the following six categories.

Defining Subject Scope

In undertaking courses that emphasize "management", there is a danger of encroaching on the realm of the business schools and administrative staff colleges and of becoming involved in the intricacies of "Theory Z", etc. In the same way, theories about information services and centres invite opportunities to create models and ideals. The Chinese, however, wanted to learn "modern management methods". It was therefore essential to understand what "management" meant to them, and to develop a succinct set of lectures that focused on practical issues and the day-to-day organization of work. A seminar approach was necessary to stimulate interaction among the participants. The curriculum had to reflect both the current information methods of information processing in more advanced centres outside China, as well as local perceptions of the problem.

Selecting Participants

The selection of participants is a key factor in developing a course that satisfies the participants' needs, enables them to assimilate course details, and ensures that the learning process is complete. Ideally, those running the course should have some say in the selection process to ensure homogeneity. ISTIC, however, found it difficult to identify suitable participants as we had requested: even at the last moment there was little indication of the size, level, and composition of the group. Consequently, it was very difficult for the instructors to prepare lectures that would provide for all the needs of the target group. Furthermore, the participants themselves apparently had little advance notice of the course: one student said he did not know he would be attending until 2 days before the course began.

Duration, Timing, and Site

There is an optimum duration for most courses, depending on the level of the participants' knowledge and understanding and on the scope of subjects to be taught. But the Kunming course, which encompassed a very broad subject area, posed a dilemma: on the one hand it was thought that a prolonged course would fail to hold the students' attention, and on the other hand, a course of short duration would be insufficient to allow the lecturers to include certain necessary details. Between 10 and 12 days (operating on a 6-day week) was deemed to be an adequate course length. But ISTIC was urged to view the course as a foundation for more intensive instruction in specific areas.

On completion of the final timetable, at the request of both ISTIC and the participants, we had to cut back the schedule to allow ISTIC time to catch up on course logistics, translations, reprography, etc., and to allow the students time for recreation and personal study of the course detail. The timing of the course was difficult to arrange because of conflicting priorities in the lecturers' own schedules, vacations and official functions at their various institutions, as well as in ISTIC itself.

The course was located away from Beijing in Southwest China to give it a higher profile in less developed areas. Although ideally one should try to avoid both hot, humid weather and the rigours of winter, choosing a suitable time of year proved to be difficult because of the diversity of personal preferences.

Selection of Lecturers

The selection of a team of lecturers is crucial to the organization and delivery of a course of this nature. Without a team approach, weaknesses in the course structure soon appear. There should be a lot of preselection and ample opportunity for the lecturers to meet and get to know each other. It is also useful to have an alternative list in case of ill-health or last-minute dropouts.

Although the Chinese language posed unique problems,. we succeeded in establishing an excellent team of lecturers, which was a bonus to the whole endeavour.

Delivery of the Course

Any course should ensure that the participants understand and quickly assimilate the material presented. From the outset, it was decided that as much of the course as possible would be presented in Chinese: this meant having to find Chinese-speaking lecturers and to translate course materials and audiovisuals into Chinese. Doing so allowed not only faster assimilation of ideas, but also considerable ease in responding to questions from the floor and in running informal evening sessions. The only alternative would have been to use simultaneous translation - which would have doubled the duration of the course, caused boredom among the students, and frustrated the lecturers' ability to communicate.

For a course of such breadth, it is important not to incorporate too much into the timetable: time should be allowed for students to catch up, lecturers to make adjustments, and for the host institution to handle the logistics.

Materials and Equipment

Sufficient time needs to be apportioned for the assembly and delivery of all necessary material and equipment. Because local Chinese institutions lack reliable audiovisual equipment, new items had to be purchased, sent ahead to the host institution and then shipped to the site. The basic equipment required included a photocopier, film and slide projectors, and an overhead projector. Electric typewriters were considered optional. Participants received in advance their own individualized bag containing background materials, such as important set texts, relevant reprints, and notebooks.

For a course of such short duration it was useful to ask the host institution to provide relevant Chinese source materials in advance. Such materials increased the value of the course for the participants and, at the same time, gave the foreign lecturers a sense of the local situation and a look at the comparative structure. A good example of this was the case study we arranged.

Costs and Logistics

The total cost of mounting a course of this type is not low, but in this case, a large portion of the expenditure went toward equipment that was lacking, as well as toward translation. Most costs were absorbed by the host institution, which provided local facilities and expenses for all participants, while IDRC provided funding for the lecturers and course materials. The sharing of work and costs in this manner was very beneficial, especially in that it offered the host new experience. For the most part, ISTIC provided both logistical support and generous hospitality. However, support staff from IDRC headquarters and the regional office played an important role that could not have been provided exclusively by ISTIC.

A great deal of flexibility was required to handle day-to-day problems; the ability to make quick, responsive changes in the program or timetable and adapt to new demands on one's time ultimately created a much more effective transfer of ideas.

Esprit de corps

A spirit of cooperation and collaboration prevailed between IDRC and ISTIC at all times. It was considered of prime importance that there be sociability between staff and students and a team approach to the course, and that the lecturers be sympathetically attuned to one another.

SURVEY OF PARTICIPANTS' BACKGROUND

Ideally, identification of the participants' background and course needs should be attempted before the course for good curriculum planning but, because this was not feasible, a general survey of the participants (see Appendix 11) was conducted early in the course to ascertain their personal data, professional experience, and individual needs. The results, which follow, indicate that most were senior managers of mature years, mostly from the deputy director level in their respective institutions. Most were university graduates (some from foreign universities), and the majority had a fair knowledge of English.

ANALYSIS OF FACILITIES AT PARTICIPANTS' INSTITUTIONS

In order to provide those attending the course with a better understanding of the strengths and weaknesses of some of China's leading information centres, represented by the participants' own institutions, a survey was made during the course. There was a wide diversity of services and equipment (Table 1). Although some centres have computers, few actually operate in a fully mechanized mode because of lack of suitable software for bibliographic purposes. Most participants highlighted the lack of facilities and equipment as well as access to training. The need for improved training opportunities was endorsed by most participants on this course.

PARTICIPANTS' INTERESTS

The topics of greatest interest to the majority of participants were how to set priorities, and how to plan and evaluate information services. Although technical aspects tended to have low priority in this early survey, technical, practical application was stressed in the final evaluation. Among the many problems encountered in their day-to-day work, those which most hindered the development of local services involved the adoption of innovations, personnel planning, training, and isolation from others in the profession.

RESULTS OF INITIAL SURVEY

* Position or title

Director	5
Deputy Director	14
Department Head	6
Deputy Department Head	8
Deputy Department Head (Library Science)	1
Deputy Bureau Chief	2
Deputy Chief Engineer	1
Editor	1
Library Head	1
Section Head	1
Engineers (includes Research Assistant, Instructor, Translator, etc.)	11
Assistant Technician	1
Others	1

* Educational background

Graduated from university	46

* Experience in library or information centre

Many years experience	30
Less experience	7
No library experience	2

* Proficiency in English

Good	2
Fair	39
None	7

* Proficiency in other languages

Japanese	8
Russian	16
German	1

* What do you expect to obtain from the course?

Table 1. Analysis of facilities at participants' institutions.

Institution	Subject scope	Operating mode	Description
Information Institute of Coal Science & Technology, Ministry of Coal Industry	Coal	C *	Library of Congress cataloging Indexes, abstracts Bibliographic Conducts own in-service training
International Service Centre, National Bureau of Meteorology, Beijing	Weather, climate	M **	Chinese classification systems Card catalog Abstracts
Institute of STI, Ministry of Communications	Transportation	C	Collects documents concerned with economics and management of traffic, highways, bridges, road construction, etc. Indexes, abstracts, Chinese classification systems
Institute of STI, Henan Province	STI	M	Card catalog, in-service training
Institute of STI, Hubei Province	STI	M	Card catalog Duplicates documents
Institute of STI, Sichuan Province	STI	M	Card catalog
National Library, Beijing	STI	C	Indexes, catalogs Classifies, stores literature
Institute of STI, Tianjin	STI	M	Catalog, indexes
Research Institute of the Technical Institute of Standardization for Building Materials	Building construction standards information	C	UDC classification Card catalog

Services	Equipment	Major constraints
Prepares current awareness services, state-of-the-art reviews, technical reports	DJS series minicomputer	Lack of training opportunities Lack of technical advances
Technical papers Newsletter In-service training	--	Lack of modern equipment Training needed Lack of knowledge of what is going on elsewhere
Newsletter State-of-the-art reviews Current contents service	Z80 and HP series 3000, MINISIS software	Shortage of trained staff Lack of knowledge of modern methods
Technical reports Aquisition list	Offset press Duplicator	Poor facilities Lack of training opportunities
Aquisition lists Occasional reports	UBIX Offset press	Shortage of funds Need for training
Technical series Reproduction of documents	Duplicator Photocopier	Poor equipment Training needed
Reproduction of documents, current contents service Some in-service training and courses	Local minicomputer experimenting with MARC format Photocopier Duplicator	Need for computerization of catalog
Current contents services, reports	--	--
State-of-the-art reviews, technical reports Printing facilities Local training	DJS series minicomputer	Lack of skilled personnel Shortage of funds

Table 1 continued.

Institution	Subject scope	Operating mode	Description
STI Institute, Ministry of Machine Building, Beijing	Engineering, machine products, metallurgy, power-generating devices	C	Card catalog, thesaurus Vocabulary control, indexes, abstracts, current literature Applications are limited to technical and economic analysis and statistical analysis
China Population Centre, Beijing	Demography	C	Abstracts, indexes, thesaurus

* C = Computer
** M = Manual

Services	Equipment	Major constraints
State-of-the-art reviews Newsletter Bibliographies SDI service Foreign data bases interrogated	HP 3000 MINISIS Offset press	Lack of training opportunities High cost of foreign data bases
Digest of statistics Duplication of documents SDI service, special bibliographies and retrospective searching Microfiching of documents	Burroughs microfiche reader/printer	Lack of training in higher level information activities

Improvement in basic skills in S&T information work	38
Better understanding of job priorities	22
More knowledge of certain problems in S&T information work	41
A base for future continuing education	29
Some knowledge in management science and techniques	35

Please state

Making plans in management
Evaluation of the results of information work
How to develop research on information science
Planning for information services at the state level
Management of documents and archives
Personnel development and training

* Knowledge of other aspects	24

Please state

Relation between information service and reference service
Acquiring documents and their effective management
Application of computers abroad
Coordination of information centre and information network
How to develop S&T information work for the service of agriculture

* What part of the curriculum interests you most?

Interested in all topics	6
Value of information	10
Function, planning and management of information centre	24
The theory of information science	10
Education and training of information science personnel	17
Application of statistics and modern techniques	13
Analysis and design of information system	4
Case study	1
Manual, semimechanical and modern methods for information search and retrieval	6
Cost-effectiveness and measurement	2
How to increase the use of documents and user survey	6

Documentation work	4
Evaluation and appraisal of information	6

* What problems you have encountered in the past in your job which you would like explained on this course?

	Yes	No
Unclearness of the objective and concept of the work	16	16
Conflicting priorities and not being able to devote oneself entirely to the job	13	17
Being out of contact with scientists or program staff	25	10
Difficulty in obtaining documents	25	11
Lacking space to house collections	18	12
Lacking sufficient work area generally	8	18
Having no firm budget for activities	12	18
Not knowing where to seek guidance to improve services	24	11
Not knowing how to link up with other resource centres	30	5
Lack of equipment	20	12
Lack of further training opportunities	32	6
Lack of contact with professional colleagues	14	12
The selection, use and evaluation of personnel	38	3
The adoption and development of new techniques	42	0
Do you have a special problem which is not adequately treated in the curriculum?	17	2

Specify

How information networks are formed

How information work can facilitate economic development and scientific research

The structural organization and personnel development of modern information centres

How to strengthen relations with information centres abroad

How to establish a documentation control centre in a data base centre with particular reference to developing countries

How to use theory to guide actions in case study

After the use of computers in cataloging and classification, what are the future directions in other countries

The mission and activities of information centres at the professional level

How libraries abroad develop their information work

The definition and evaluation of the results of information work

The basic theory of information science with reference to its nature and content

The current situation of information centres abroad and their reference work

What the social value of information work is

The peak use time of S&T documents, including periodicals

The analysis of information.

COURSE EVALUATION

The participants divided into four groups to evaluate the course. The group leaders were: Mr Wang Yusong, Director, Institute of Scientific and Technical Information, Shaanxi Province; Mr Duan Ying, Deputy Director, Institute of Scientific and Technical Information, Xinjiang Autonomous Region; Mr Rui Shusheng, Director, Information Institute for Coal Science and Technology, Ministry of Coal Industry, Beijing; and Mr Wei Yumui, Director, Institute of Scientific and Technical Information, Herbei Province, who spoke for the group leader, Mr Yan Yimin, Asscciate Professor, Library Science Department, Wuhan University. The general comments were as follows.

GROUP 1

Group 1 thought that the course was very successful. Through the lectures, much was learned about the current status of and experience in library and information services in Canada and the USA - which offered a useful model for the development of information services in China. A good example of this was the lecture on the successes and failures in designing a library building. The lectures on the theories, objectives, methods and implementation of information services, as well as the needs of users were deemed to be very revealing and important.

The use of films and slidas to illustrate actual case studies helped the participants to more clearly understand library and information services abroad. All lecturers were considered to be highly dedicated to their lectures, having prepared their presentations well and for the most part in Chinese. If the course had a major shortcoming, it was the lack of time for the elaboration of some important issues.

GROUP 2

Group 2 tended to consist of younger information workers, university instructors, and cadres who were enthusiastic and yet somewhat intellectual in their approach to the course. Because many of the participants had not traveled abroad, their vision was broadened by this course. For example, they had previously thought that information service in the West was either a part of or a branch of library services, as opposed to in China, where the development of scientific and technical information service was independent of the development of library services.

Participants realized that the use of modern technology in information work, such as the on-line storage and retrieval of information, has transformed formerly limited and discrete resources into a limitless pool of information. Scientific management in the West was definitely seen as user-oriented, whereas "eating from the big pot" (a Chinese proverb which means that everyone eats the same regardless of how much one contributes) was used as an example of the Chinese approach to information sharing. In this respect, it was thought that China needs to pay greater attention to cost-effectiveness, which has been an important concern in the West.

The participants also learned that information centres should make every effort to satisfy the information needs of their users. The group felt that all had benefited from the balance of practice and theory in the course. Because of the varied backgrounds and expectations of the participants, it was thought that the course might have been more effective if divided into three areas of concentration:

- Management (for managers);
- Theories (for teachers); and
- Practical approaches (for practioners).

GROUP 3

The third group concurred with the evaluations of the first two groups. Some of the most important things that the participants in Group 3 learned may be summarized as follows:

- Modern information services are no longer single-tracked or isolated - networking is important;
- Modernization of information services need not be achieved by the use of the computer alone, but should emphasize "services" and cost-effectiveness;
- Greater attention should be paid to the needs of the users, and to improving the education and training of information workers;
- Removing unnecessary barriers to the sharing of information resources is of utmost importance;
- Information analysis and the repackaging of special subjects is also important;
- The development of an information network in China has just begun - it is necessary to consider foreign experiences in order to avoid mistakes and expedite the process.

Lectures considered to be especially useful included the ones on OCLC, building design and Chinese I/O. The one major conclusion was that the course schedule was too full and left little time for discussion and assimilation.

GROUP 4

This group felt that this was the first course of its kind in which the participants had had the opportunity to interact with the lecturers because of the use of Chinese both for lectures and audiovisuals, and although the participants had different backgrounds and experiences, all benefited from the course.

SUMMARY

All four groups expressed their profound gratitude to IDRC, ISTIC and the lecturers, as well as to their hosts from Yunnan Province who made the course possible. They also were impressed by the efforts of the lecturers in carrying out their responsibilities even though some of them were ill.

In evaluating the course, ISTIC proferred three points for future consideration:

- Because of China's lack of basic knowledge of information science and the importance of being able to relate theory to practice, it was felt that some of the lecturers should have placed more emphasis on "hands-on" methods;

- More time should have been devoted to discussion to enable the participants to relate course content to their own particular situation; and

- More instruction might have been given on how to set up an information centre, i.e., the step-by-step procedure.

In recognition of these points, the lecturers considered it difficult to effectively deliver to the participants without prior knowledge of their intellectual level and professional background. In future courses, it would be helpful to obtain information about the candidates, especially regarding their "hands-on" experience, before planning the curriculum.

A seminar approach was adopted for this course and both lecturers and participants were available for discussion outside of class. Although there might have been a better balance of discussion and formal lecture, it was important to provide basic instruction in the subjects in the time available. Essentially, this course should be considered an introductory course upon which ISTIC might build more detailed courses with more time available for discussion.

Answers to the formal questionnaire on the evaluation of the course follow.

PARTICIPANTS' EVALUATION: A SUMMARY[1]

* What was the primary objective you envisaged when you decided to participate in this course?

To acquire knowledge on the modern management of scientific and technical information centres	36
To learn about the management, organization, and operation of information centres in other countries	30
To improve professional knowledge and skills	13
To learn about new technologies applicable to information work	10
To learn about staff training and continuing education	8
To study the transition from manual to computerized operations	4
To study the theories of information science	3
To exchange experiences with other participants	2
To learn about the setting up of a computer system	2
To learn the methods in the evaluation of information services	1
To study information storage and retrieval	1
To learn about the research on information analysis	1

* By attending the course, have you attained your objective?

Yes, basically	37

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[1] Based on 58 returns, some of which were incomplete.

Yes, only partially	15
No	0

* The aim of this course was to provide understanding of different aspects, functions, and tasks of information centres. Please evaluate your comprehension of the following areas of the instruction:

	Fully Understood	Partially Understood	Not Understood
Introduction to information science: past, present, and future	28	30	0
Value of information	40	18	0
The on-line revolution	26	29	0
Application of new information technology	19	38	0
Predecessors of modern computerized systems: manual and semimechanized information systems	34	20	1
On-line circulation system on minicomputer	19	35	3
Main types of information centres	43	14	0
Canada Institute of Scientific and Technical Information	26	30	0
How to manage and link all components together	30	26	0
Star or distributed network	39	18	1
Coordination and networking - the Chinese case	37	14	0

Scientific information exchange and transfer of technology	20	36	0
Organization and management of special libraries	22	33	1
Management techniques/ issues/examples	14	35	1
Cost-effectiveness and recovery	19	35	0
Organizational structure of information centres; functions, planning and management of information centres	38	20	0
Institutional budgeting	34	24	0
User needs and user satisfaction	49	8	0
Improving bibliographic control from national perspective	28	27	0
Chinese I/O and processing	6	47	4
Information systems development	27	30	0
Sources of information	50	7	0
Nonconventional information	49	9	0
Nonconventional media; nonprint materials	39	16	0
Computerized data bases	18	37	0
Performance evaluations: quantitative and qualitative approach[2]	22	27	0
Human resources developments[2]	28	19	1

Staff development and continuing education[2]	35	13	0

* The most interesting or useful subjects, according to my judgment, were the following:

Organizational structure of information centres; function, planning and management of information centres	26
User needs and user satisfaction	16
Staff development and continuing education	14
Value of information	12
Main types of information centres	10
Cost-effectiveness and recovery	8
Application of new information technology	8
Computerized data bases	7
Human resources development	6
Star or distributed network	6
Information systems development	6
Most of the topics in the course	5
Performance evaluation: quantitative and qualitative approach	5
The on-line revolution	5
Information/reference service	4
Information storage and retrieval	3
Facility planning and management	3

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[2] Because the participants were asked to return their evaluation form before the course was over, some of the participants did not have time to rate these lectures.

On-line circulation system on minicomputer	3
How to manage and link all components together	3
Sources of information	3
CISTI	2
Institutional budgeting	2
Staff organization and classification	1
Scientific information exchange and transfer of technology	1
Improving bibliographic control	1
Information work in other countries	1
Nonconventional information	1
Information science: past, present, and future	1
OCLC	1
Chinese I/O and processing	1

* Less interesting or useful subjects, according to my judgment, were the following:

Predecessors of modern computerized systems: manual and semimechanized information systems	11
Institutional budgeting	3
Nonconventional information	2
Information analysis and research	2
Chinese I/O and processing	2
Too much emphasis on Western information systems; some are already known, others are not applicable to Chinese situation	2

Improving bibliographic control	1
Information science: past, present and future	1

* The organization or development of the course could be improved by the following modifications:

The course covered too many topics; some of the overlapped ones can be combined or omitted so that they can be taught in greater detail and depth	15
Topics on management of information centres should be more specific and detailed	13
The arrangement of the lectures was not very systematic and could be improved	10
There should be more time for discussion and exchange of experience by participants	9
Many of the lectures drew on foreign experiences and practices which do not relate well to the Chinese situation and needs	9
Lecture notes (or their translation) should be made available to the participants before the course	6
The selection of participants should be given more care so that they can be more homogeneous in their background, experiences, level, and needs in matching with the course objectives and design	3
The focus of the course should be more on management and less on general introduction	3
Perhaps the course should be divided into several courses, some dealing with general topics and others with special topics	2
The lecturers should also give their views and evaluation of the special case study, particularly from the theoretical viewpoint	2

There should also be Chinese lecturers to lecture on Chinese experiences	2
Foreign lecturers should be given an overview of the Chinese situation through a field trip before the preparation of the course	2
A summary of the conclusions of each lecture would be very useful	2
There should be more emphasis on the practice of management than on the theory	2
It could be very beneficial to have practice or hands-on sessions	1

* Was the length of the course sufficient?

Sufficient	25
Not sufficient	28

* Was the presentation of lectures clear and understandable?

Yes	36
Yes for some and no for others[3]	18
No	0

* Generally speaking, how would you evaluate the course?

Excellent	2
Good	46
Average	9
Bad	0

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3. Many participants commented that, due to the comprehensive coverage of the course and the shortage of time, there was not enough time for discussion or for the participants to digest the material, nor was there enough time for lecturers to fully explain their topics. The language barrier and lack of lecture notes before the course were also mentioned.

Part Two

The Curriculum

INTRODUCTION TO INFORMATION SCIENCE: PAST, PRESENT AND FUTURE

M. Beckman

EARLY BEGINNINGS

Over the centuries, scholars have attempted to organize the records of manuscripts, books, documents - whatever the evidence of human intellectualism. The theory of such organizational activity has therefore become a discipline in itself. The beginnings of systematic bibliography can be seen in the inventories and catalogs of the individual librarians in Europe, the Middle East and Asia, dating back more than 2000 years; before that time there were undoubtedly attempts of which we are unaware.

FIRST WORLD BIBLIOGRAPHY

The first known attempt to compile a "world bibliography" was that of a Swiss scientist, Von Gesnei, who by 1565 had almost completed a bibliography of world writings in Greek, Latin and Hebrew. In North America, the first proposal for a national union catalog of all material in the United States was made in 1853. It did not materialize because of the inadequacy of technology, but there were attempts to systematize bibliography in colonial America as well as in Europe during the same period. Panizzi, at the British Museum, was involved in codifying the rules for bibliographic compilation before 1900.

NINETEENTH CENTURY

By the end of the 19th century, the bibliographic problem was becoming serious. In response to this concern, the International Institute of Bibliography (IIB) was organized in Brussels, Belgium in 1892, and it planned an international compilation of recorded it planned an international compilation of recorded bibliographic information. In the following 50 years, the magnitude of this task led to an entirely new body of techniques for organization, subject analysis, bibliographic description, and annotation. It was felt that these new theories and practices differed so markedly from conventional or traditional library practices that this new technology came to be called "documentation".

In Europe, "documentation" referred to the nonconventional library or archival techniques used for the organization and analysis of documents as distinct from books. The Universal Decimal Classification scheme (UDC) developed at this time was never intended for the classification of books in a library, but rather was a system of codes or symbols for associating various aspects of the documents.

The IIB led to the International Federation of Documentation (FID), which had a great influence on the development of documentation. For a while, a major concern was defining the term itself and distinguishing the activity of documentalists from that of librarians. Briefly, documentation is the task of matching the pattern of scholarly activity in the use of primary graphic records to the pattern of intermediary services which transmit primary recorded material from one scholar producer to a scholar user. By contrast, bibliographic organization is concerned with channeling all graphic records to all users for all purposes in such a way that they will have optimum use.

In addition to concern about new techniques for relating and retrieving the contents of documents, an interest in microreproduction arose as a result of improvements in photography in the 1930s. For a while, it was suggested that microfilm or microcards would supplant printed books as the medium for recorded knowledge, and that there would be one big depository for all books, journals and indexes on microfilm, to be copied and sent to anyone who made a request. Although there was a lot of activity in this area for a while, microreproduction - as a major concern of information science - was supplanted by newer technologies.

AMERICAN AND INTERNATIONAL DOCUMENTATION BEFORE 1960

The American Institute of Documentation (ADI) was established in 1937, primarily because of the interest of its founding members in the organization and retrieval of scientific information. Under the auspices of UNESCO, members of this society met with international colleagues but there was no organized cooperation until the influence of the microreproduction enthusiasts in ADI declined. Moreover, FID was still promoting the UDC - which was not acceptable to ADI. Until 1960, therefore, both in North America and Europe, documentation became a forum for competing philosophies about analysis and retrieval, and such terms as "semantic factoring" and "role indicators" were common in the literature.

INFORMATION SCIENCE AFTER 1958

Although the European documentalists maintained the original definition of documentation, in the United States the term came increasingly to mean any nonconventional library method for the subject analysis of graphic records and any research activity related to those methods. The transformation of documentation into information science can be dated from 1958, when an International Conference on Scientific Information was held in Washington. This conference expanded the parameters of the discipline to include linguistics, machine translation, automated abstracting and indexing, professional education for information scientists, etc. In attendance were major figures in documentation from Europe, North and South America, and Asia.

There was also an increasing interest in the creation and use of scientific and technical information - caused, of course, by the advance in space exploration, beginning with the successful flight of Sputnik in 1957. The best expression of this new interest was in the statement of the U.S. President's Science Advisory Committee: "Transfer of information is an inseparable part of research and development. All those concerned with research and development - individual scientists, engineers, industrial and academic research establishments, technical societies, Government agencies - must all accept responsibility for the transfer of information in the same degree and spirit that they accept responsibility for research and development itself".

Although the term "information science" began to be used after 1958, arguments about its definition continued. To me, the most acceptable definition was given in 1962 at the Georgia Institute of Technology: "Information science is the science that investigates the properties and behaviour of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability. The processes include the origination, dissemination, collection, organization, storage, retrieval, interpretation, and use of information". It is also recognized that information has its base in three fields: information theory, which includes cybernetics, linguistics and logic; information technology, which includes communications and computer science; and library and information centre management.

The greatest impetus to developments in information science since 1958 has been the computer. Originally considered most appropriate for numerical analysis, the third generation of computers such as the IBM 370/148 (with miniaturized components made possible by integrated circuits and with increased data-storage capabilities) were true information-processing machines. Billions of units of stored information could now be accessed. The use of computers, coupled with advances in telecommunications, was seen as the answer to information science problems.

PRESENT ISSUES

It was not until the 1970s that information scientists realized that the problem of information organization, access, and retrieval were more complex than previously understood. A number of issues, including the following, have been addressed.

Standardization

The introduction of computers into information handling complicated as well as expanded the capabilities. As long as the records describing the information in the document were produced manually, codes or regulations for the classification systems or record descriptions allowed more or less similar systems to develop. However, the computer systems allowed individual libraries or information centres to establish, with relative ease, their own unique systems for handling data. Even when machine-readable records produced at the Library of Congress (i.e., Machine Readable Cataloging, MARC) were used by a library, they were frequently adjusted to meet local requirements.

This situation became complicated by the grouping of libraries into networks, which resulted in a need for the transfer of information between individual libraries and between the networks. In order to transfer information readily, standards were needed in several areas: Record formats, communication protocols, and user-interface protocols.

Role of Communications

Communications became an issue in information science when it became feasible to link a user in a remote area (via his or her terminal and a communications line) to a distant information data base held on a large computer. It was therefore possible for information to be held in only one place, and, with intelligent communication policies, for all users theoretically to have access to it. In Canada, the cost of information transfer via communication lines has been made "distance-independent", i.e., the cost of accessing information held in a centralised data base is the same, no matter how distant the user may be.

Equally important is the need to link individual computer systems so that data can be transferred from one to another or shared. This is the area in which standards assume such importance.

Definitions and Research

A variety of definitions continue to be developed in information science, with concern now being expressed about the need for a theoretical base.

This theoretical base is being supplied in part by basic research. Bradford's Law, Small's structures of literature, and Goffman's epidemic theory have all contributed. Bibliometrics has become a minor discipline in some departments of information science: researchers attempt to predict what information sources will be used by different types of scientists, how frequently they will be used, and what generational pattern exists. One of the problems, however, is that most practising information scientists are not aware of the research being done, and do not integrate research results into the planning of information centre services.

FUTURE IMPACTS

As discussed earlier, coordination and standardization have become important issues, as users and information centres access remote data bases via communication lines. Although computer technology initially led to centralization of both data bases and facilities, new developments are now directed toward decentralization. Four major developments include the following:

- Integrated circuits (a method for storing bits of computer information, which is relatively inexpensive and has high potential for compactness) have brought the cost and size of computers down drastically. Consequently, a microcomputer based on a "microchip" is feasible for even the smallest library or information centre. This means that communication costs are now higher than microprocessing costs, resulting in the decentralization of information networks.

- Fibre optics, which is the use of lasers of light through fibre optic cable instead of waves of electricity through copper wire, also impacts on information handling. It is lower in cost, smaller in size, has a larger band-width, and offers interference-free transmission. The only difficulty still to be overcome involves signal switching - which is needed to provide flexibility in information-transfer systems.

- Satellite transmission is also becoming less expensive and should provide attractive possibilities. The advantages of satellite transmission are that it is a broadcasting system (and therefore each point in a network can be connected to all other points), and it has capabilities for reaching very remote areas.

- A data-base machine is a device for storing a data base, in which the relationships are inherent in the machine itself. This will greatly reduce the cost of complicated, relational information retrieval, allowing the user to develop his/her own search strategies without concern about system degradation or the cost of constructing the elaborate reference system necessary for such retrieval.

All these developments are leading to more emphasis on distributed or decentralized information networks.

New formats will also have an impact, although they are not being implemented as quickly as originally believed. Videodisk, which will hold 54,000 pages of information on one side of a 12-inch platter, has not yet been made available commercially. Electronic publishing will also produce information in a new format, and experiments in this field are underway in Canada, the United States and Europe. With information available only in machine-readable form via a terminal, the complexity of identifying and coordinating access to such information becomes more crucial. Similarly, videotext imposes new problems, as the user will be able to access graphic and textual data in his/her own home via a television set. Research is needed to ascertain how users will react to these new information formats and integrate them into their present personal information system.

Information networks for the sharing of both the records and the documents become more important with the increasing complexity of information, and of its organization, access, and retrieval. But because networks will be discussed in more detail later in our seminar, I would like to conclude with a brief review of the role of specialized information centres or libraries in the information science continuum.

A special library or information centre can be defined as an information facility responsible for providing access to specialized information to meet the needs of a special clientele, usually within a parent organization such as a company, institute, government department or museum. It is felt that the information workers in such a library or centre require knowledge or training in the specialized discipline of the organization, and may or may not have training in traditional library or information science.

The first specialized information centre in Europe was believed to have been a business library established by a salesman in Hamburg in 1735. Other commercial libraries were established in Bordeaux, France in 1845, London in 1872, and Glasgow, Scotland in 1916. The recent growth in number is related to the industrialization movement in the last part of the 19th century, and an unprecedented increase occurred again after 1950 when the value of information was realized. This is certainly evident in Canada, where a large proportion of libraries can be categorized in the specialized information centre group. As the production of information continues to expand, so will the need for information centres. Such centres will allow the information in documents that is so crucial to our society, our industry and our governments to be organized, analyzed, stored, and made available to all those who require access to it.

VALUE OF INFORMATION

T.C. Ting

CONCEPTS OF DATA AND INFORMATION

Data are symbols that can be recognized and processed by humans or machines (Fig. 1) and information is the interpretation of the data.

The value of information is now more important than ever because of the information explosion. The impact of ever-increasing volumes of information - scientific, technical, societal, economic, and legal - is a global phenomenon. The profusion of information now requires entire networks and clearinghouses to control and store them. Information arises totally out of human actions. It describes everything in the world written and communicated by human beings. The information spectrum depicts the interrelationships of information, i.e., the producers, handlers, and users. It also indicates the methods, media, and modes by which information is handled.

Because of the needs of science and technology in an ever-demanding socioeconomic environment, information is a critical resource. Information is the most basic resource for managing other resources. It is the focal point of many activities (Fig. 2).

Information is the key to scientific and technological advancement and information may be described as a scientific product just like any other commodity a group of processors comes together to handle.

Unfortunately, information is all too often treated by all of us like the air we breathe: it is omnipresent, accepted, and relied upon, but seldom examined too

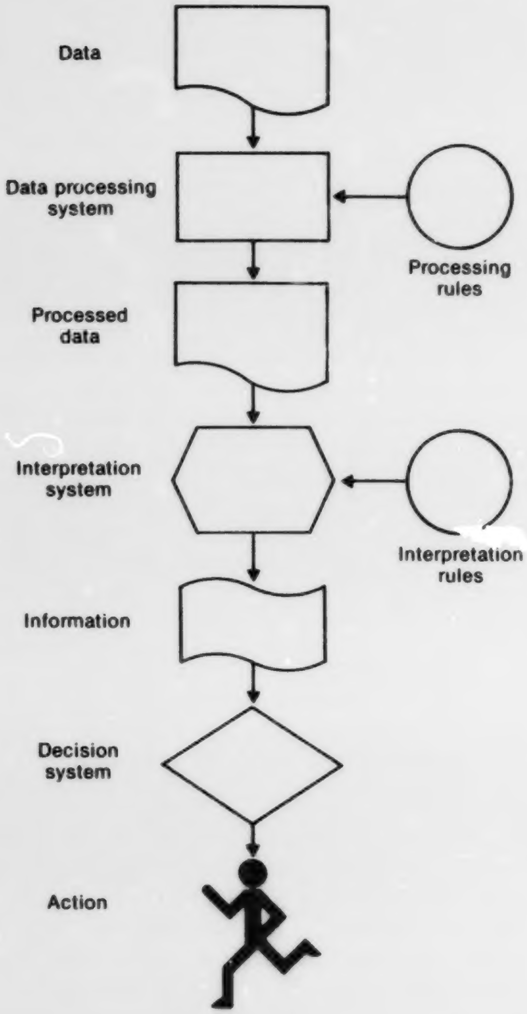
Data
Data processing system
Processing rules
Processed data
Interpretation system
Interpretation rules
Information
Decision system
Action

Fig. 1. From data to action.

closely. The costs of information processing in an increasingly complex and costly world are now enormous. The comptroller general of the USA reported that federal paperwork costs have climbed from an estimated $8 billion in 1966 to $43 billion in 1978. This

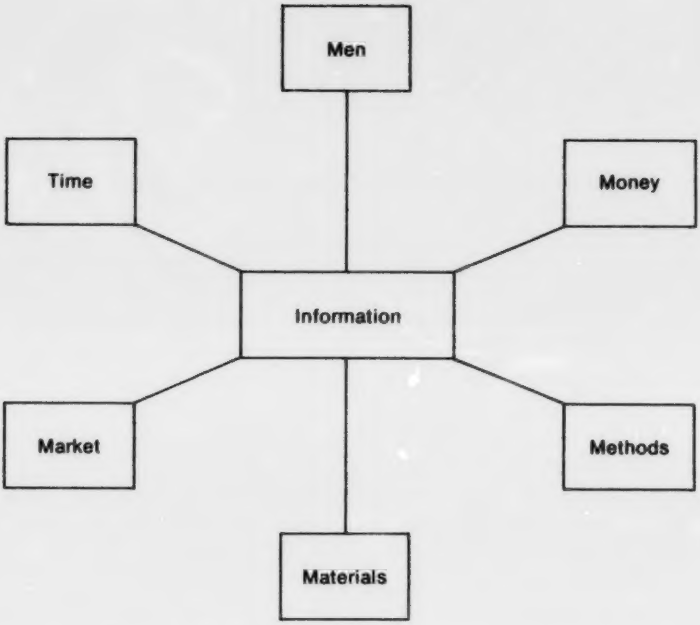

Fig. 2. Information at the focus.

emphasizes the need for better management of information.

Numerous programs, organizations, and activities have been initiated to help deal with the information problem, but few far-reaching policies or long-range plans have been formulated that encompass the major aspects of information and how it affects the lives of people. The development of a workable information system will have to deal with problems of identifying users and sources, selecting methods and technologies, funding, staffing, and facilities.

EVALUATION OF INFORMATION POLICY

T.C. Ting

The goals of an information centre are related to the ultimate benefits of the centre; for example, to aid in the creative use of information for promotion of scientific advancement. These types of statement sound impressive to convince the public of the value of the information centre but they are not easily (if at all) measurable.

Table 1. Component aspects of the search process.

Results of catalog searches

	Known-item searches	Successes		Failures	
		No.	%	No.	%
Centre A	636	515	81.0	121	19.0
B	448	298	66.5	150	33.5
C	405	287	70.9	118	29.1

Collection failure versus user failure

	Total failures		User failures	
	No.	%	No.	%
Centre A	121	19.0	82	13.7
B	150	33.5	27	8.3
C	118	29.1	76	20.9

Use of catalog

	Catalog users		Nonusers	
	No.	%	No.	%
Centre A	1914	54	1338	41
B	596	32	853	68
C	1275	73	479	27

An information centre's objectives are practical and, to a certain degree, measurable and can be used as a basis for evaluation. The overall objectives of an information centre are:

- Making information maximally accessible to the user, and
- Maximizing the exposure of the users to its information.

The first point suggests a somewhat passive information service; the second carries a more active connotation.

Measurement can include any one or more of the following concepts: resource allocation, decision theory, dynamic programing, inventory models, optimization, and heuristic methods.

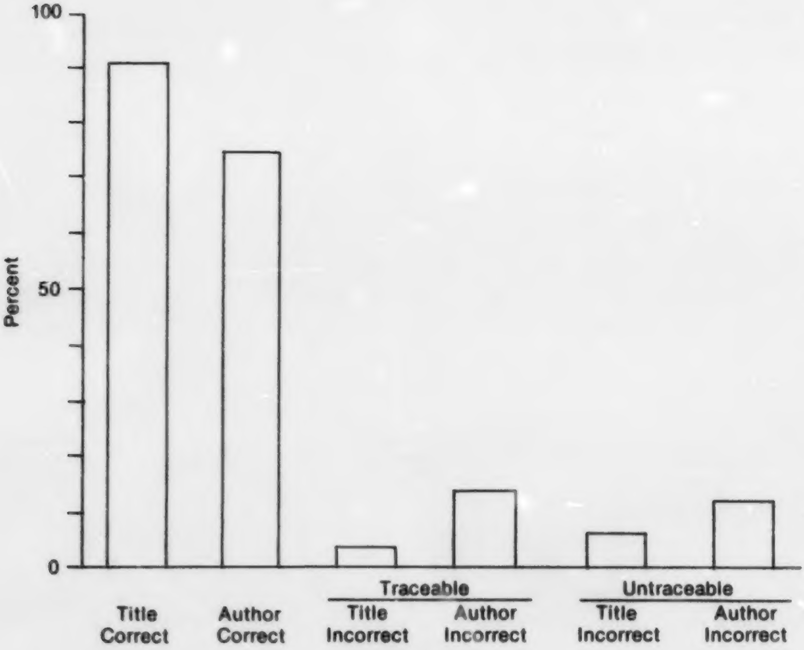

Fig. 1. Analysis of search failure.

These involve the use of statistics. Statistics is one of the major tools for the studies of information accessibility of an information centre. They are a very valuable means of, for instance, quantifying searches of the catalog in a library (Table 1) or analyzing reasons for search failures (Fig. 1).

From statistics, we can also draw attention to the amount of use a catalog receives over a given period (Fig. 2).

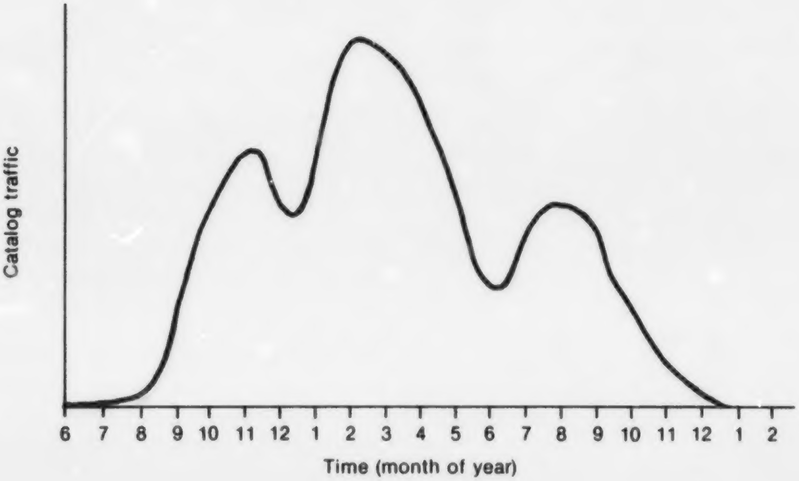

Fig. 2. Analysis of catalog use.

Other techniques of evaluation are psychometric techniques for assessing individual attitudes toward information seeking. This technique is used to make information accessible in ways most convenient to the user. Ease of use is a major consideration in selecting an information source. It is the overriding factor influencing whether a particular information service is used or not.

INFORMATION SYSTEMS

GENERALIZED PROFILE OF AN INTERNATIONALLY ORIENTED INFORMATION MANAGEMENT SYSTEM FOR LIBRARIES AND INFORMATION CENTRES, WITH MINISIS AS A CASE STUDY

K.P. Broadbent [1]

INTRODUCTION

Although we often have the illusion that the computerized information society has already arrived, relatively few information management and retrieval systems that are widely accepted have yet been developed for libraries and information centres. Such software packages have generally been developed for mainframe computers to handle the needs of a specialized user group. In most cases, they have either provided processing for one or more library technical functions or provided retrieval from a large data base, but not both.

However, at least two major developments are currently forcing this situation to change. The first is well known - the decreasing relative costs of computer hardware associated with the advent of minicomputers and microcomputers. Computer processing power is reaching even small information centres through on-line computer services and/or in-house systems. In relation to the latter, we can expect new software packages for information management and retrieval in growing numbers and diversity.

The second and less widely recognized force is the creation and growth of international cooperative information networks, such as AGRIS in the field of agriculture and DEVSIS in the field of social and economic development. Local, regional and national centres participating in these information networks require tools both to supply input to and to process output from the networks. These tools must also satisfy a variety of international user needs.

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[1] Adapted from an original text by C.A. Godfrey (IDRC).

PERCEPTIONS OF INTERNATIONAL SYSTEMS

Information systems and their design are essentially a result of human perceptions of the world. Whereas commercially developed information systems tend to reflect views of the marketplace, on the international scene, within the United Nations organizations and regional organizations like the European Economic Community, perceptions of political and social organization dominate information systems. These perceptions are illustrated in Fig. 1.

Looking at the political organization of the world,

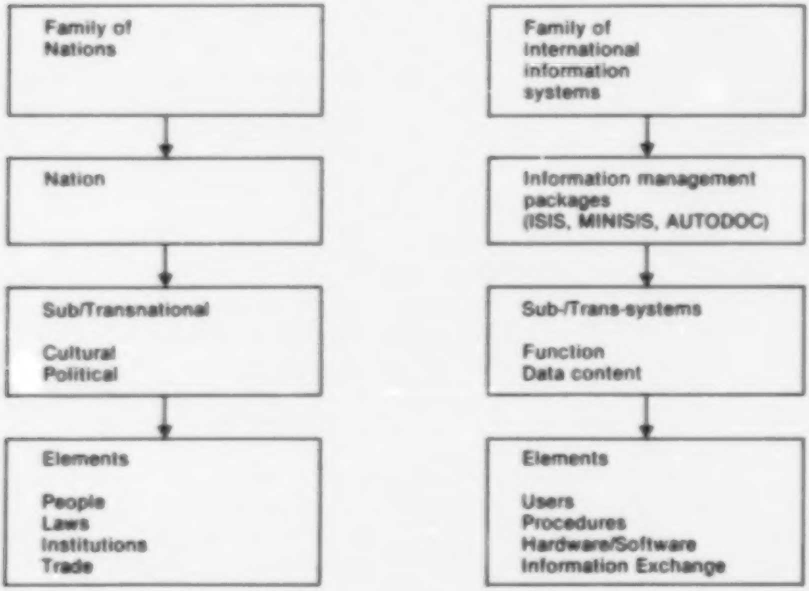
Family of Nations
Nation
Sub/Transnational
Cultural
Political
Elements
People
Laws
Institutions
Trade
Family of international information systems
Information management packages (ISIS, MINISIS, AUTODOC)
Sub-/Trans-systems
Function
Data content
Elements
Users
Procedures
Hardware/Software
Information Exchange

Fig. 1. Relationship of information systems to the international scene.

one can easily distinguish three levels of organization: international, national, and subnational or transnational. The principal elements that constitute these systems are people, laws, institutions and trade. Likewise, in the world of information systems, we can also distinguish a family of internationally oriented software packages, such as ISIS (developed by International Labour Organization), MINISIS (developed by IDRC in Canada), and AUTODOC (of the Organization for Economic Cooperation and Development).

Each software package consists of subsystems to handle separate functions or applications, depending on the type of data being processed. The principal elements in these systems are analogous to hardware/software tools and information exchange.

USER RIGHTS

Ideally, both political systems and information packages exist to satisfy the needs of their constituent people users. On the international political scene, human rights are now recognized. It is equally reasonable that rights should be defined for the users of international information systems.

Naturally, ideals are not always realized, but this should not deter us from formulating them. Most importantly, users within the international user community should have the right to:

- Choose between alternative computer systems;
- Exert a reasonable degree of control over the system;
- Force orderly change in the system (evolution rather than revolution);
- Get out of the system what is put into it;
- Work in their own language;
- Be protected against catastrophes; and
- Exchange information and interact with other

systems.

This list can be used as criteria to evaluate the suitability of internationally oriented information management and retrieval packages.

MINISIS

The technical details of the MINISIS package are not covered here but can be obtained directly from IDRC in Ottawa or from one of the distributors in developed countries (currently Systemhouse in North America, Assyst-Raet in the Benelux and Great Britain, and Seric in France).

However, let us review MINISIS generally, using the points in our list of user rights.

Alternative Computer Systems

MINISIS, which operates only on Hewlett-Packard (HP) 3000 computers, was developed as one alternative to the ISIS system currently distributed by UNESCO and which operates on IBM computers. It is hoped that functionally similar packages will become available on other hardware.

User Control

MINISIS is a modular system which gives the user access to the most essential functions without the necessity of programing. The data-base manager need only be an intelligent user rather than a computer specialist. Moreover, the HP minicomputers on which the system operates do not require a large team of specialists to maintain them. With proper training, users can control both hardware and software.

Change

Users of MINISIS can bring about change in one of several ways. The information management system is sufficiently flexible to allow users to change data definitions, structures and relations without major conversions. Users can write their own programs to satisfy any special needs. In addition, users can express their demands or wishes either directly or through their representative in the MINISIS users' group (which meets annually to review their experience and the expected developments with the system).

Input and Output

A number of user-operated modules are supplied for entering, updating, retrieving, sorting, computing and printing or displaying data. Great emphasis has been placed on user retrieval and manipulation of the data.

Language

Both English and French language versions are currently distributed; users can use up to 10 different language versions in one installation. Alternate character sets are now being implemented, with Arabic being the first non-Roman alphabet to be tested. Facilities are also included for using multilingual thesauri, and in some installations the UNESCO macrothesaurus is currently in use.

Protection

MINISIS is a partly relational data-base management system with utilities for security and data backup and recovery.

Exchange of Information

The data structure and definitions in MINISIS bear a close affinity to the international standards of ISO and UNISIST for handling bibliographic information. Modules are supplied for accepting and producing information in ISO 2709 format and in a simple, sequential, tagged format.

As of early 1982, there were 47 installations of MINISIS in 16 countries, so that one can clearly say that there has been a general international acceptance of the system. The most serious obstacle to more widespread use by libraries and information centres is that its use is limited to HP-3000 computers. To overcome this problem, it will be necessary for motivated users to examine the functional specifications of the existing member packages in the family of international information systems and to implement these on other hardware. Indeed, there are indications that efforts in this direction have already begun with microcomputers. These initiatives are welcomed by the international community, which supports the user's right to a choice of alternative systems.

AGRIS: AN INTERNATIONAL INFORMATION SYSTEM FOR AGRICULTURAL SCIENCE AND TECHNOLOGY

Olga Lendvay

ESTABLISHING THE SYSTEM

AGRIS is a cooperative system for collecting and making known current information on the world's agricultural literature. A main reason for establishing AGRIS was that there was poor coverage in existing major indexes of agricultural documents produced in developing countries - documents that represent the world's agricultural literature.

FAO's role in the development of the system was as follows:

- FAO's information specialists, together with well-known information experts from several countries, studied this problem of poor coverage of agricultural documents and, to remedy the situation, proposed a new global system (AGRIS).
- To test the proposed system, in 1973 FAO produced an experimental issue of an index (Agrindex) in cooperation with both developing and industrialized countries.
- The proposal for the new system and its experimental product were well received by the FAO-member countries; and at the 17th Conference, their representatives gave FAO a mandate to make it operational in January 1975.
- The Director General of FAO invited all FAO-member countries to participate in the system. The participation implied designation of an AGRIS Liaison

Officer and of a national input centre in each country.

- In its Library and Documentation Systems Division, FAO created a new unit - the AGRIS Coordinating Centre - and made it responsible for implementing the system.

AGRIS COORDINATING CENTRE

The initial responsibilities of the Coordinating Centre were to:

- Define the scope of AGRIS,
- Develop methodologies and working tools,
- Train in AGRIS input (and later in the use of AGRIS products),
- Develop products, and
- Strengthen and maintain contacts with AGRIS Liaison Officers and National Input Centres.

The subject scope of AGRIS was defined so as to include all areas in which FAO is active - agriculture, as well as fisheries, forestry, natural resources, food science and nutrition, and home economics. It was to concentrate on research, but also to be mission-oriented and include some of the extension literature.

The development of methodologies and working tools includes:

- Input sheet,
- AGRIS Guidelines for Bibliographic Description,
- AGRIS Classification Scheme (17 categories, 68 subcategories, 816 commodities, 592 geographic codes),
- AGROVOC (agricultural macrothesaurus), and
- AGRIS Guide to Indexing (draft).

Training in data-input methodologies includes:

- Seminars (regional and national),
- Individual training in Rome and in countries with AGRIS centres, and
- Self-instructional package (AGRIS Input Pack - programed learning, mixed media pack).

Training in the use of AGRIS products includes:

- Group and individual training,
- Self-instructional package for AGRIS users (Pack No. 2), and
- Audiovisual presentation, "Using AGRIS" (with slides, Pack No. 1).

Products developed include the following:

- AGRIS monthly magnetic tape. References received during the month from all countries - on magnetic tape, work sheets and OCR sheets - are merged on one tape. Abstracts, which some countries send with references, are also included on the tape.
- Agrindex. Printed monthly, this index contains all references included on the tape except the abstracts.
- Selective Dissemination of Information (SDI). National AGRIS centres that have computer facilities can produce SDI from monthly tapes, which are available to them free of charge.
- National bibliographies. Countries use references they provided to AGRIS for producing their own national bibliographies.
- Specialized bibliographies. These can be produced from AGRIS tapes on any subject included in the system. The existing ones are on different crops, such as cassava.

- Retrospective searches. Any topic included in the system can be searched retrospectively from the whole data base.

HOW DOES THE SYSTEM WORK?

The AGRIS system functions in the following manner:

- National AGRIS Input Centres provide bibliographic information (on magnetic tape, OCR sheets or input sheets) on agricultural publications produced in their own countries to the AGRIS Processing Unit in Vienna at the Atomic Energy Agency.
- Bibliographic references received from all National Input Centres are merged every month on a magnetic tape and photocomposed film is produced.
- Photocomposed film is used for printing monthly issues of the Agrindex.
- Free copies of the index are sent to all National Input Centres and subscribers.
- Magnetic tape is sent to National Input Centres that have access to computers.

ADVANTAGES OF PARTICIPATION IN THE SYSTEM

Participation in the AGRIS system has several advantages:

- By supplying bibliographic references on agricultural documents produced in their own country, participants receive references which have been reported by all other participating countries.
- By reporting information into the system, participating countries have a chance to establish and maintain an inventory of the agricultural documents that they produce.
- Methodologies and working tools devised by information experts are available to them; personnel

of National Input Centres is trained in analysis and bibliographic description of documents.

- Countries can organize their own national information structures around the system.
- Participants do not have to keep track of potentially useful foreign information and can concentrate on domestically produced information.

CODOC: AN AUTOMATED SYSTEM FOR ORGANIZING GOVERNMENT PUBLICATIONS

M. Beckman

NEED FOR CHANGE IN ORGANIZATION

One of the most serious problems facing information centre managers has been that of the increasing output of publications from governments or semiofficial bodies - often referred to as government documents. In the past 20 years, technical report literature, often emanating from the same bodies as the documents, has been added to these collections. This has often caused chaos for libraries or information centres as they attempted to cope with this mounting influx of material.

Two situations most frequently were the result. In one, the documents and reports were routed to the Catalog Department where they waited, as low priority items, to be fed into the regular cataloging stream and created enormous backlogs of cataloging. In the other, they were sent to a separate area of the centre, frequently a basement, and were placed on shelves or in filing cabinets; there was little attempt at organization, and access or retrieval was almost entirely dependent on the memory of the staff member who filed or shelved the material.

TRADITIONAL ORGANIZATION

Aside from those information centres which attempted to integrate all documents and reports into the general collection of monographs and serials, there are two other traditional methods used for organizing documents and reports.

Separate Collection

In this instance, the documents and reports are housed separately, and access is not available through either the classification scheme or the catalog. In the United States, the most common practice is to use the number or classification supplied by the Superintendent of Documents for all official federal documents, with similar schemes used for the publications of states and other jurisdictions. A simpler version of the same philosophy is merely to house the material together alphabetically by issuing body. The printed catalogs and indexes, where they exist, are then used to provide access. Staff members in each centre frequently prepare special indexes for any material that is of particular importance to their organization or institution.

The disadvantages of such an organizational system are many. The majority of jurisdictions outside the United States do not supply a classification scheme or an index for their own publications. Access by personal author, title, subject or report number is therefore difficult or even impossible. The result is a multiplicity of separate arrangements, some with their own notation system, some without, and with great emphasis placed on the memory of the staff members serving the collection.

Combination System

The second system is a compromise: it links the cataloging done for the integrated collection with the indexes available for the separate collection. The simplest way of linking the card catalog to the indexes is to provide "see also" cards in the catalog. The documents are usually cataloged as serials without analytics, and references are made on the cards to the printed indexes. Unfortunately, this system complicates the process of locating the actual publication wanted. It can also be almost as time-consuming as regular cataloging if all the reference links are included in both card catalogs and printed index.

Briefly, then, information centres with documents and reports have had, for the most part, to choose between two systems: a scattered arrangement with a unified organizational system, as exemplified in the integrated collection; or a unified arrangement (in terms of country, if not notation) with a diversified organization, as exists in the separate collection.

In the late 1960s, new technology provided the answer to the problem: the computer made it possible to have a separate collection primarily in order of issuing body, but at the same time have a single or unified arrangement and organization for the collection, accessible through the same system as other holdings in the library or information centre.

DESIGN REQUIREMENTS

A new system was designed at the University of Guelph in Canada in 1967 in response to the problems outlined above. Thousands of documents and reports had been shelved in an almost unorganized fashion, with little (if any) access provided through catalogs or indexes. After analyzing several existing documentation systems which, by today's standards, made use of primitive automation techniques, the following design requirements were established:

- As much information as possible should be recorded at the source from the document in hand, without dependence on standards, rules, etc. (e.g., AACR2).

- The document should be on the shelf within a very short time after its initial handling.

- All data elements needed for access points should be identified and explicitly defined. A distinction should be made between those needing quick access from a sorting viewpoint, and those which do not (i.e., quick-sort fields versus variable fields).

- To arrange the publications on the shelves so that browsing is possible, a notation scheme with a country and organization base is required.

- The notation scheme must provide the link for the records and therefore for the indexes.

- Computer-produced indexes or catalogs (in book or microfiche format) capable of updating on a regular basis, or the more recent on-line public inquiry terminals should provide access to the collection. The indexes or machine file should be accessible by personal author, corporate author, title, serial, series title, document or report number, and some form of subject retrieval.

In summary, the design parameters can be simply stated: the system must be inexpensive and simple, it must meet the needs of its users, and it must take advantage of computer capabilities. With these objectives in mind, the next step was to design the system itself, a system called "the Guelph Document System".

DEVELOPMENT OF THE CLASSIFICATION CODE

The most important code developed for the system was the document code - numbers that are unique for each publication. The basis for the Guelph code was the Luhn code. This 11-digit code, developed by Hans Peter Luhn, lends itself particularly to monographs with personal authors: it uses the first four characters of an author's name, the first two initials, the last two digits of the data of publication, and the initial character of the first three keywords in the title. The concepts of the Luhn code were combined with those of a similar code developed at the University of Oklahoma to produce the Guelph document code. It is a 15-digit code which consists of the following components.

Country Code

The first two digits (alphabetic) are the country code. The following are examples:

Canada	CA
United States	US
India	ID
China	CH

Part Code

The third digit, which is numeric, is used to distinguish among the various hierarchies of government within a country, to allow publications of a province, county or city to be distinct from one another within that country. They are as follows:

Federal	1
Province or state	2
County	3
City/town	4
National institutions	5
Societies or associations	6
Firms or companies	7

Province or State Code

This is a two character alpha code that arranges documents in order under part two of the country code (the "part code"). Some examples are:

Ontario	ON
New Brunswick	NB
Connecticut	CO
Vermont	VE

Major Organization Code

This is a two-character alpha assignment, intended to keep agencies in a desired order. Examples of this code are:

Canada Department of Agriculture	CA1 DA
US Department of Commerce	US1 DC

Subdivision Code

A two-digit Arabic number allows for subdivisions of a major division of a government or organization.

The following is an example:

Canada Department of Agriculture, Research Branch	CA1 DA31

Year of Publication Code

The last two digits of the date are used, except for publications of earlier centuries, which have alphabetic designations. Some examples of this code are:

1967	67
1802	Q2
1814	R4
1702	G2

Title Code

The first letter of the first keyword is used with two digits from the Cutter-Sanborn table. An example is:

Airport bird detection	A31

Series Code

To emphasize the series in which most documents and reports are published, the series title and number are substituted for title and Cutter number in the final part of the code. Here is one example:

Smithsonian Studies in Heating and Technology, No. 139	S139

Thus, the document code meets the defined objectives: it gives a geographical base to the arrangement of the collection; it encourages browsing through the logical subdivision of each organization or jurisdiction; and it is simple and economical to apply.

DEVELOPMENT OF OTHER CODES

Other codes have been designed in order to provide quick access to parts of the machine record or to provide information which is not implicit in the document itself.

Type of Material Code

This one-character code distinguishes between monographs, serials, bulletins, etc. Some examples are:

Bulletin	A
Monograph	M

Location Code

This one-character code identifies the location of a document if it is to be in a multibranch system.

Source Code

A one-digit code provides information about how the document was received, e.g., from a mailing list, deposit account, as a gift.

Language Code

This is a one-digit code which provides explicit information about language - an important requirement in Canada. Examples of this code are:

English	1
French	2
English and French	3

Subject Identification Code

This two-character code, taken from the Library of Congress classification scheme, allows documents and reports to be analysed by subject profiles similar to those of the book and serial collections.

Physical Description or Frequency Code

Two digits are used to describe the format of a monographic document (e.g., "MM" for microfilm) or the frequency of a serial ("MN" for monthly).

Function Code

This code is the method of identifying the various parts or elements of the data contained in the bibliographic record, thus making the item accessible by any element uniquely identified. The following are examples:

Corporate author	11
Title	21
Personal author - first author	31
Holding record	41
Added corporate author	51
Series code - main series	61

The various functions are identified on the coding sheet for input to a batch computer system, or on a terminal screen for input to an on-line system.

SYSTEM DESCRIPTION

The original Guelph Document System began operation in 1967. Input was originally done from the coding sheets using keypunch machines, and then advanced through data recorders, optical character recognition (using a Selectric typewriter with an OCR ball) and data collection terminals to direct on-line terminal input.

In a batch system, the data is input to a batch tape which is merged at stated intervals (e.g., monthly) with the document masterfile, which is also on batch tape. Interim output is produced from each batch tape, with complete catalogs produced from the masterfile at selected intervals. Either complete catalogs or specially defined lists can be retrieved from the masterfile by any of the data elements identified in the record.

Because the document and report collection at Guelph now numbers more than 400,000, all catalogs are produced on microfiche and are distributed throughout the library and the campus, and are shared with other libraries or information centres in the area. There are seven catalogs produced: Personal author, Corporate author, Title, Serial, Series title, Subject (keyword), and Document code.

In addition to the COM/fiche catalogs, Guelph also provides access to its document and report collections through an integrated on-line system. A user may query the terminal system by title for example, without knowing whether the item is a book or document, and the title will be retrieved regardless of format. This has been accomplished without converting the document file to the standardized catalog format (MARC). Rather, the various data elements of each record are dispersed to different locations in the machine file storage and linked together with keys, pointers or indexes. Thus, personal names from the Guelph document file are held in the same location as those from a monograph file. When displayed on the inquiry terminal at the request of a user, they are displayed as names. If a user or staff member wants to see a complete record, a simple instruction pulls it together. The location displayed with the record includes the document code of the Library of Congress classification number and will direct the user to the appropriate section of the library.

Subject access in the Guelph Document System is provided through a "Keyword out-of-context" (KWOC) program. This automatically sorts and lists all significant words and selected phrases from each document title. They are displayed separately from the title itself in the COM/fiche KWOC catalog listing.

A facility for title enrichment also exists in the system for those documents with nonrelevant titles. Extra descriptors can be added into the title function field and handled by the system as if they were part of the title. A "stop-word" list is employed with the KWOC program to prevent the listing of articles and other words that are not useful for subject searching (e.g., "a", "the", "of").

OUTLINE OF CODING PROCEDURES

In a library using the Guelph Document System, coding is done by nonprofessional staff and supervised by a manager with relevant experience but not necessarily a degree in library or information science. Coding can be divided into four levels of difficulty:

- Serial coding, for a title whose entry has already been established, consists of simply adding the existing document code to each new item and indicating the holdings on a coding sheet.

- Block coding consists of coding new pieces of a series when the series has already been established in the system. Minimal additional information has to be added to the basic coding form for the series. (Partly completed series forms can be kept in a file for photocopying in order to reduce the time spent coding by the clerical assistant.)

- The coding of new monographs, serial titles, or corporate authors already on the file means that two-thirds of the code and the entire corporate author have been established. Parts of the header field (i.e., the other codes) and the bibliographic elements related to the function codes will have to be assigned from the title page by the coding assistant.

- Coding material for which no previous entry has been established will require assistance from the supervisor or professional staff of the documentation centre. Government organizational manuals, yearbooks, or other official lists and publications will have to be consulted in order to determine the relationship of the new corporate body to its jurisdiction and the correct form of entry. Following guidelines in the Coding Manual, codes for the corporate author and base document are established in accordance with those already existing in the system.

COOPERATIVE USE OF THE GUELPH DOCUMENT SYSTEM

The Guelph Document System attracted considerable interest from other libraries and information centres within a few years after it was established. Several such libraries implemented the system after 1970, and in 1973 a consortium of Ontario university users was formed to use the system cooperatively.

According to this cooperative system (called CODOC), each library uses the system independently but sends a tape of newly added records for a merge into a union file at regular intervals. An annual CODOC union catalog is produced in COM/fiche, and now consists of more than a million records. Access is also possible through the on-line retrieval system, CAN/OLE, since the CODOC file is mounted at CISTI. Several public and government libraries and information centres have also implemented the system.

A major advantage for libraries joining the CODOC system is that they can extract copies of records from the union file and create a master file of their own immediately. Retrospective coding can be very simple for everything but material unique to that library. Furthermore, a library does not need to have its own computer for processing: many libraries lease services from a neighbouring library or university, for the system requires only that the coding be done in-house.

SUMMARY

The Guelph Document System and the cooperative form, CODOC, are thus simple, comprehensive systems, providing access to the complete document and report collection of any library or information centre. Coding is fast and processing inexpensive, so that it takes a fraction of normal cataloging costs to process the material. Many types of materials besides documents and reports can be handled by the system: the system at Guelph is used for the organization of pamphlets, theses, manuscripts, annual reports and university archives, in addition to official documents and technical reports. All items are retrieved from one file by author, title, corporate author or keyword, using either COM/fiche catalogs or an on-line inquiry terminal. Such a documentation system is therefore an acceptable alternative to more traditional, and more expensive, methods of organizing and processing material in a library or information centre.

APPLICATION OF NEW TECHNOLOGY

T.C. Ting

EVOLUTION OF INFORMATION SOURCES AND SERVICES

Information services consist basically of two processes: retrospective processes and awareness processes.

Retrospective processes provide users with capabilities to search and query an existing collection of information. Awareness processes select and furnish users with information or references to information as it is received or collected (Fig. 1).

INFORMATION TECHNOLOGY

The various forms of information technology are: microforms, computers, telecommunications, distributed computer networks, text processing, and audio and video devices.

The result of using information technology is not just a quantitative difference due to expanded capacity, but a qualitative one. A great potential advantage of automated systems is their versatility.

The sharing of information resources is an important goal of using information technology. Information systems serve many users. The same collection may be processed and presented to users in different forms that will be utilised for a broad spectrum of objectives.

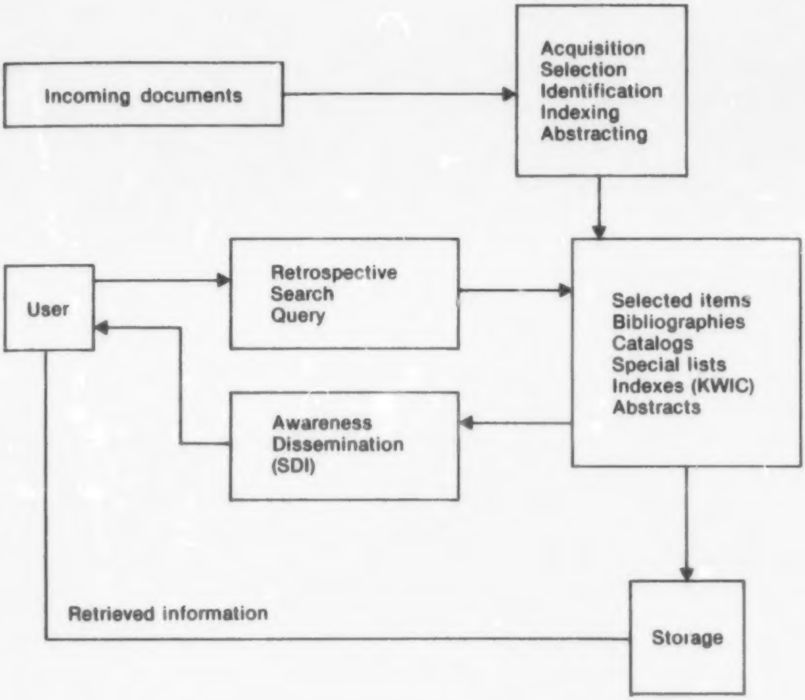
Incoming documents
Acquisition
Selection
Identification
Indexing
Abstracting
User
Retrospective
Search
Query
Selected items
Bibliographies
Catalogs
Special lists
Indexes (KWIC)
Abstracts
Awareness
Dissemination
(SDI)
Retrieved information
Storage

Fig. 1. Relationship of user to the information system.

SYSTEMS APPROACH TO THE MANAGEMENT OF INFORMATION RESOURCES

This approach uses both the human and machine components to establish a whole system that can function optimally for achieving information goals. The system's objectives and the performance measures of the whole system are thus: the environment, resources, components, and management of the system.

RECENT DEVELOPMENTS IN COMPUTING AND COMMUNICATIONS TECHNOLOGY

The main development has been the symbiosis of computer and communications technologies, i.e., information technology. This basically has increased the speed of processing and the reliability of data and has helped reduce costs (Table 1). In simple terms, this means that the quality of information has been improved.

Table 1. Performance of disk storage.

Year of introduction	Capacity (Mbyte)	Data rate (kbyte/sec)	Cost ($/Mbyte)
1964	7.25	156	90.00
1967	30	312	24.00
1971	100	806	8.00
1976	317	1190	3.50
1981	1000	1560	1.70

Clearly, costs per byte have fallen dramatically over the years to the point where it is now much more economical to utilize computers than to do the lengthy manual checking tasks involved in information retrieval.

New applications are now being made possible by the newer machines and include: transmitting of data, voice, and image. But the main application of new data and input technology will be the technological approaches to information processing. That is, in automatic indexing, abstracting, cataloging, and retrieval. At the same time, there are now alternatives for storing information such as microform and machine-readable storage.

With regard to the question of storing versus reproduction of information, there are now the possibilities of: facsimiles and document transfer, telecommunication, digital and video broadcasting, and home computers and information services. These are now very commonplace in the more industrialized countries and enable the user to be put in direct contact with the originators of information and, in a sense, give the user greater choice and a voice in shaping future services.

PREDECESSORS OF MODERN COMPUTERIZED SYSTEMS: MANUAL AND SEMIMECHANIZED INFORMATION SYSTEMS

Olga Lendvay

Before computers became widely used for handling information on the identification of documents, some manual and semimechanized systems were used and are still preferred for handling especially small collections on narrow subjects.

Three such systems became well known among librarians and researchers for gaining easy access to collections. They are:

- Optical coincidence system (Peek-a-boo),
- Edge-notched cards, and
- Uniterm.

OPTICAL COINCIDENCE SYSTEM

The principle involved in the optical coincidence (Peek-a-boo) system is that the light coming through holes on cards identifies the desired documents which have consecutive numbers assigned to them.

To make the system work, the following components are required: vocabulary, special cards for drilling holes, container to hold the cards, catalog cards, container for catalog cards, punch for drilling holes, and light box.

The steps involved in storing information are as follows:

- Documents are assigned consecutive numbers when they are received in the library;

- Documents are analyzed for subject content;
- Subjects are assigned to optical coincidence cards (one subject per card) in accordance with the vocabulary;
- Holes corresponding with the consecutive numbers of documents are drilled into individual cards of pertinent subjects; and
- Index cards are prepared with bibliographic information on individual documents (full references) plus their consecutive number. Any other information, (e.g., an abstract) can be added on the card.

In order to search optical coincidence cards, it is necessary to:

- Remove from the file of optical coincidence cards those cards which correspond with the subjects to be retrieved;
- Hold the chosen cards up to the light or place them on a light box (light coming through the holes represents the consecutive numbers of documents on the subjects to be retrieved); and
- For identification of those documents, check the index cards with the same consecutive number.

The cost of equipment depends on the size of the card file and the sophistication of the equipment (drill, light box, filing cabinets, etc.).

The advantages of the system are as follows:

- The system is easy to manipulate;
- It encourages users to browse;
- It permits rapid searching; and
- Research results can be read fast.

Its disadvantages include the following:

- It is necessary to refer to a second information source to obtain a description of documents or to determine their relevance;
- There can be problems in error correction (wrong drilling of holes); and
- Searching takes longer when the second and third boxes of cards are used.

EDGE-NOTCHED CARDS

With this system, every document is represented by one card on which coded subjects are punched into notches around their edges.

The following items required are: edge-notched cards printed with code numbers to represent vocabulary terms, punch, needle, and container for cards.

The steps involved in storing information are:

- Documents are scanned for subject pertinence;
- Subjects (descriptors) are punched on the edges of the cards with assigned codes corresponding to specific holes; and
- Complete bibliographic reference of the document (and also other desired information, such as an abstract) with its location number are entered on the body of the card.

Information is retrieved as follows:

- A needle is passed through the pack of cards at the hole (i.e., coded subject) that is being searched; and
- The pack of cards is shaken: cards that have been notched where the needle passed through will drop out, leaving the rest of the cards on the needle.

With direct coding, each hole represents a specific subject. To retrieve an item, only one hole is searched.

The advantages of edge-notched cards are:

- The system is simple and economical;
- Direct coding is done with speed and precision;
- All information is on one card - there is no need to go to a secondary source;
- Cards do not have to be kept in any order; and
- Retrieval is easy.

UNITERM SYSTEM

With the Uniterm System, consecutive numbers of documents are registered on individual cards, documents are assigned subject terms (descriptors) and are retrieved by comparing the numbers on the cards of the subjects to be retrieved.

To make it work, it is necessary to have:

- Cards (preferably 5 x 8 inch) with lines, 10 columns and space at the top for descriptors;
- Index (catalog) cards, for complete references, abstract, consecutive number of document, and eventually call number; and
- Containers for holding both sets of cards.

The steps involved in storing information are as follows:

- All consecutive numbers of documents are registered on one Uniterm card belonging to one subject. (The last digit of the number should be used to fit into the column of that number, e.g., No. 739 is registered in column 9, not 7);
- Cards are kept in a box in strict alphabetical order;

- Cross references are inserted for synonyms; and
- New cards are made when columns are full.

To retrieve information, it is necessary to:

- Take the cards you wish to coordinate out of the box;
- Scan the numbers on each card to see which ones appear on all of them;
- Make notes of the consecutive numbers; and
- For identification of documents, check index cards with the same consecutive numbers.

The cost of the system is minimal; you pay only for Uniterm and index cards.

The advantage of the system is that it is simple: all documents on one subject are displayed on one card.

The disadvantage is that scanning on several cards is more tedious and open to error.

ON-LINE CIRCULATION SYSTEM ON A MINICOMPUTER

M. Beckman

INTRODUCTION

One of the most labour-intensive operations in a library or information centre is circulation: the checking in and checking out of material such as books, documents, and periodicals. Unfortunately, circulation is also the activity most associated with errors. When you add to the basic routines those of locating and retrieving overdue books, and of identifying requested books and holding or reserving them for patrons, it is not difficult to understand why circulation was a primary candidate for automation.

During the early years of the development of automated circulation systems, large-scale or mainframe computers (such as an IBM 360/50 or Sigma 7) were used with data collection terminals operating in an off-line or batch mode. Although such systems were a great improvement on manual systems, it was necessary to depend on printouts or listings of transactions of the previous day. Thus, a library user did not truly know where a wanted book was - the system was always 24 hours late.

On-line computer technology has allowed a change from the batch-oriented, mainframe-dependent automated system to one which directly responds to the need of the user, as well as to the requirements of management to operate in a more cost-effective manner. A detailed description of one library's experience in moving from off-line to on-line systems may be a useful way to explain both the need for the change and the benefits which have accrued. The library used as an example is at the University of Guelph in Ontario, Canada.

The University of Guelph Library has a collection of more than one million volumes and serves 10,000 students. The central library building, which opened in 1968, was designed for an automated circulation system. This early system, using punched book cards and patron badges, served reasonably well until 1976: a circulation transaction list was printed daily, and overdue and fine notices, error and edit check lists, as well as management reports were produced as required.

By 1976, some 500,000 items were circulated from the Library annually. Double that amount was in library use, including the noncirculating journals. Because of conditions created by these numbers, the knowledge of changing technology, and the need to hold constant or to reduce library positions, an on-line system for circulation was considered early in 1976. This consideration took the form of a study that identified the specific problems or inadequacies of the existing circulation system, and specified design requirements for a new one.

INADEQUACIES OF OFF-LINE BATCH-MODE SYSTEM

The Library staff study team identified a number of inadequacies.

Mechanical Breakdown

As a result of the transaction load mentioned above, the percentage of errors in the circulation system increased greatly during 1975 and 1976 due to problems with the C-Dek terminals. Mohawk Data Corporation had stopped production on these terminals in 1975, and mechanical breakdowns increased to the point where an average of three service calls were required each week instead of one call every 3 weeks as had been necessary in 1974. Each time a terminal broke down, the likelihood of incorrect data being recorded was increased. The manufacturer claimed that the terminals were not designed to take such an excessive transaction load.

Errors

The method of data collection using punched cards and badges had double-punch and blank-column detection to prevent incorrect data from being accepted. This unsophisticated method of automatic checking allowed errors to creep into the system undetected. In addition, students in increasing numbers found ways to subvert the system, the most common being the switching of book cards between books.

Despite all efforts by the Guelph Library staff, errors continued in the final outputs of the circulation system - overdue and fine notices sent to patrons. These incorrect notices created a great deal of unnecessary friction between the Library staff and the user community, and undermined the public relations efforts of the Library to an unfortunate extent.

Current technology for data collection uses bar-coded labels, with an error potential of 1 in 200,000 reads. This rate can be further reduced by a 1 in 10 chance of the error matching a correct record; thus, the total theoretical error possibility is 1 in 2 million. It was felt that the adoption of such a system at Guelph would not only eliminate errors, but also stop the subverting of the data by patrons, because the labels are manufactured in such a way that any attempt to remove them results in their destruction.

Inefficient and Costly Use of Staff

The Library circulation staff developed a series of checks and counter-checks to compensate for the errors present in the off-line system. These checks were very time-consuming and expensive and put an unnecessary load on an already overburdened staff. The cost of this checking was estimated at $13,500 annually.

Another area in which inefficiencies were evident was in the library holds procedure. This is one of the most critical procedures performed in the Library, requiring the manual checking of the approximately one million books reshelved each year. This checking is done for the most part by student assistants: the fact that they were part-time and that there were so many of them, magnified the chances for error. The use of the holds procedure increased by an average of 50% per year from 1972, averaging 4000 requests in the fall and winter semesters of 1975-76.

It was concluded that an on-line system would eliminate the necessity for this manual checking routine at an annual saving of over $9000 in staff time. In addition, another cause of user dissatisfaction would be removed because the capture of items requested by patrons would be facilitated at the circulation point, before books reached the shelves or were charged out of the Library.

Reserve Desk

Use of the reserve-book system had increased by almost 30% per year from the time the Library opened in 1968, stretching the capacity of the simple semiautomated system to its limits. It was realized that a more sophisticated system was necessary, not only to maintain efficient service for the students without adding to staff numbers, but also to provide the management information necessary to ensure that the reserve service was responsive to the needs of the teaching program.

Mechanization

The Library continued to be dependent on the central computer of the University, over which it had no control. The priorities of other units frequently delayed the production of the circulation transaction list - a serious problem for the Library. As well, charges for the operation of the central computer were increasing annually and putting a strain on the Library's budget.

Study Conclusions

The study conducted by the Library staff concluded that there would be primarily three benefits from conversion to an on-line system with bar-coded labels:

- Any data entered into the system would be checked for correctness at the time of capture, not 12-24 hours later. This would greatly reduce any possibility of error.

- An on-line system would not be as susceptible to human error because data checking, the checking of overdue and fine notices, and the holds procedure would all form part of the automated control system.

- The fact that an on-line system would be less labour-intensive was also an important consideration. The annual predicted saving of $22,500 in staff time could not be transferred to other areas of the Library to reduce work-load problems; it was estimated, however, that existing or expanded circulation and reserve activities could be maintained without requiring more Library staff (which would otherwise be necessary).

DESIGN REQUIREMENTS FOR AN ON-LINE CIRCULATION SYSTEM

Design requirements for an on-line circulation system identified by the study team fell into two categories. The first encompassed traditional library circulation functions; the second reflected the philosophy of the University of Guelph Library.

According to functional requirements, the system must:

- Accurately record book and borrower information for each transaction;

- Check each borrower record to determine if the borrower is in good standing;

- Check each item to ensure that it is not required to satisfy a hold request during both check-in and check-out procedures;

- Allow easy renewal of material if no hold exists;

- Allow circulation of reserve items and government documents;

- Produce overdue and fine notices as well as any other reports necessary for successful operation of the system;

- Allow rapid, easy access to the status of library material while protecting the privacy of the user community;
- Accurately maintain all necessary files and provide simple accurate updating of those files;
- Provide adequate security of the system data through the use of passwords and procedure restrictions;
- Provide timely signals to the Library to allow it to react more effectively to potential problems; and
- Provide accurate, timely management information on the circulation system and use of all library materials.

According to general requirements, the system must:

- Operate on an in-house minicomputer, with adequate backup procedures to ensure continuous operation;
- Provide capability for direct use by the students and faculty, minimizing the involvement of library staff in routine enquiry procedures;
- Provide capability for on-line catalog enquiry as part of the circulation system;
- Be able to interface with other components of the library system, providing an integrated and responsive library operation; and
- Provide capability for linking with on-line circulation systems operating in other Ontario university libraries.

These latter requirements were most influential in making the final selection of an appropriate system because no existing on-line circulation system seemed to encompass either the philosophy or power which the

Guelph situation demanded. It was essential to have a minicomputer capable of storing and processing all Guelph files of machine-readable records, irrespective of record format or file size.

EVALUATION OF ALTERNATIVES

The study team prepared a specification document which outlined all factors to be considered in the selection of a system. These factors were as follows:

- Computer capacity,
- Disc capacity,
- Number of terminals to be connected,
- Cost of labels,
- Backup facilities,
- Maintenance and service requirements and capabilities,
- Fail-safe capabilities,
- Future expansion,
- Adaptability,
- Possible integration with other library functions,
- Future development,
- Financial stability of the supplier,
- Implementation schedule, and
- Conversion problems.

After much deliberation, it was agreed that a proposal involving joint software design would be accepted. This proposal was from a Canadian computer company, GEAC Canada Ltd, which had had previous success in developing minicomputer-based banking systems. The minicomputer hardware which they offered, the GEAC 8000, is a powerful machine with 256K in its CPU processor. Connected to this are two 300-megabyte disc drives, one bar-code label printer, one backup mini (the GEAC 800 with 64K and a 55-megabyte disc drive), one printer, and 26 terminals with light pens. In addition to the power and capability provided by the hardware, Guelph accepted the GEAC proposal for the following reasons:

- The price was the most attractive offered.
- The proposal provided the most flexibility in satisfying the stated requirements.
- It would allow gradual conversion to the bar-code system through the use of an interim terminal that would read existing punched cards and labels as well as bar-coded labels.
- With the exception of one of the turnkey proposals, the accepted one offered the earliest resolution to the problems identified above.
- The system designed with the involvement of Guelph Library staff would allow the staff to make modifications with relatively little difficulty.
- The reserve power provided by the GEAC computer would allow the orderly development of a total on-line system for all library functions. It had become apparent that the library staff (175 full-time equivalent positions in 1976-77) could not continue to handle increasing library use and demands for additional and more sophisticated services. Further reduction of labour-intensive activities in the technical services was considered essential: in-house on-line systems were seen as the only viable solution. It was projected that up to 15 positions could be reassigned within the next 5 years with the conversion from off-line to on-line systems.
- The accepted proposal encompassed the most comprehensive circulation system, allowing the Library to eliminate all causes of error and patron dissatisfaction. It would also effect, most immediately, the saving in staff time discussed above.

SYSTEM DESIGN

Design Rationale: File

Although an efficient on-line circulation system was the primary objective of the design phase, the need for coordination with the cataloging, acquisition, serials and document systems was an essential aspect of the Guelph design philosophy. For this reason, the design phase began with a study of file structures in bibliographic processing systems elsewhere in North America and Europe. Without hindering the circulation function, it was hoped that integrated access to all the Guelph records in their varying formats could be provided, without the necessity of actual conversion to a common record structure.

This objective was met by adopting a method of structuring the files for internal processing similar to that of the DOBIS system, implemented at Dortmund, West Germany in 1976. This system disperses the various data elements of each record to different files and links them together with keys, pointers and/or indexes. Thus, the personal names from the monograph file (which has a MARC-like structure) are held in the same location as personal names from the Guelph document file with its simple documentation structure. When displayed on the terminal, names from both files are shown together as names. If a user or staff member wants to see a complete record, a simple instruction pulls the record together. The call number or document number related to a name, title, or other data element, reveals to the user whether a record is for a monograph, document, or whatever. It should be apparent that an authority system is inherent in the system, without the additional expense of creating and maintaining a separate one.

Design Rationale: Public Enquiry

The second key criterion in the system design was that of public enquiry or use of the system. The University of Guelph Library's experience with retrieval systems (such as CAN/OLE, Lockheed and SDC) had indicated that a necessary part of the service was for staff to act as intermediaries. It was agreed that, at a time of financial restraint, it would not be appropriate to have a circulation system which depended on library staff to also interpret or assist in access to the Guelph data bases for monographs, serials, documents and maps, or to files of information regarding circulation and reserve-system transactions.

The enquiry module of the circulation system was designed, therefore, with self-instructing display screens, leading sequentially from one command or question to another. Each set of functions is displayed in a "menu" from which the user selects the key desired. After locating the title of a book or document, the user can then move to another set of functions to determine the location, status, and/or loan period of the book, and to place a hold on it if it is out in circulation. The user may also inquire about his/her own borrowing record - whether there are books out, when they are due, the amount of fines (if any), etc.

If a student or faculty member becomes confused at any point in using the enquiry terminal, a simple action brings back the first menu or display, which begins the step-by-step instructions again.

Equipment

As described above, the GEAC 8000 has 256K in its CPU processor, with two 300-megabyte disc drives enabling all files and systems to be stored and/or processed on-line simultaneously. Also connected to the minicomputer is a 125-inch/second (3.17 m/sec) magnetic tape drive, a 300-line/minute printer, and an intelligent communications controller - a microprocessor itself, with 32 communication ports and a CRT (cathode-ray tube) control console.

Backup facilities are provided within the Library, using a small minicomputer that can provide a degraded circulation service (i.e., the essential charging and discharging of books).

The terminal is an intelligent CRT display with a typewriter keyboard and light pen. The light pen is attached to the terminal and is used to read bar-coded labels on both the patron's card and the library material. One quick wanding in either direction is all that is normally required to read the bar code successfully, and advanced error-checking capabilities eliminate the chances of either a wanding or transmission error being undetected.

The operating system facilitates the processing of bibliographic information by allowing complete variability of field and record structures. In addition, all record fields are bit-aligned, and advanced data impression techniques allow high performance and rapid response. The file structure of the indexes is also very efficient, and the data-base management system permits the modification in size or definition of any field by means of a device called "wrapped files".

System Capabilities

Response time in all inquiry functions averages 2 seconds, with the maximum being less than 3 seconds. The terminal ports operate on 1200-baud lines. A response time of 1 second could be achieved by stringing one terminal to each port.

Normal routines allow the system to:

- Distinguish multiple volumes and copies of the same call number;
- Handle up to 256 types of patron codes;
- Vary the length of the loan period;
- Identify a restricted or ineligible borrower;
- Recognize holds and notify patrons;
- Produce lists of holds in call number order and adjust the queue;
- Place holds on all copies of a title or against a unique copy;
- Produce overdues while the system is operating (because the GEAC 8000 has nine partitions, with

one used to run overdues);

- List overdues in call number order;
- Provide access to the history of a patron's fines (for staff member (limited) or patron only); and
- Provide item directories by primary or secondary location.

The reserve system is able to:

- Charge books to a course or professor;
- Circulate books hourly or a variation thereof;
- Identify holds and fine overdues;
- Generate notices daily;
- Produce directories by course or professor;
- Activate or deactivate previously identified course lists; and
- Provide management information (reserve) by course, item, or professor.

Management (system) information provided includes:

- The cumulation of circulation statistics by time of day, week, month, and/or year;
- Recall and hold counts by date (time, etc.) and item;
- Items in use (with each item used in the library - serials, books, documents, etc. - being wanded prior to reshelving); and
- Identification of frequently or infrequently used material by type of borrower, location, terminal, etc.

The system is flexible in the following ways:

- The item file can be increased to 2 million;
- The patron file can be increased to 500,000;
- Terminals can be increased to more than 100 without degrading response time or requiring additional hardware;
- The system has been extended to remote locations on campus, using Library and other terminals; and
- The system is interfacing with those in other universities in a network environment.

ON-LINE FUNCTIONS

Each terminal in the system offers a selection of functions which are displayed on the CRT in a menu. The command format is a numeric one, and the display itself indicates to the user how to select a desired function from the menu, and how to proceed with each subsequent step or procedure.

PLANNING FOR LIBRARY AUTOMATION USING MINISIS

K.P. Broadbent [1]

THE SYSTEMS STUDY

Before making the decision to automate a library, a thorough study of the existing manual operations should be undertaken. The results of such a systems study will indicate whether automation is feasible and cost-effective, or whether all that is required is to streamline the existing manual operations.

The study must be as objective as possible and therefore should not be done in isolation by a person intimately involved in the operation of the library. Ideally, it should be done by an individual who has a knowledge of both automated and bibliographic procedures. If there is not a person with the requisite qualifications within the organization, management should either hire a consultant to complete the study, or have the organization's systems personnel complete the study in conjunction with a member of the library staff. (If the study results in a recommendation to automate, the library staff member should continue to be the liaison with systems personnel even after the system is fully operational.)

The study should address the following questions:

1. What are the library's objectives? How do the library's operations relate to these objectives? How do the library's objectives fit into the overall objectives of the organization?

2. Where does the library fit into the hierarchy

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[1] Adapted from an original text by M. Sly (IDRC).

of the organization? To whom does the librarian report?

3. Are there other libraries or information centres within the organization? How does the library interface with these other information activities? Is there overlap in service, collection, etc.?

4. What is the library's budget? How is it broken down? Is it adequate?

5. What is a comprehensive definition of the library's current operations? What is actually being done - in qualitative and quantitative terms? All procedures should be examined according to such questions as:

- What is done? What services are provided? To whom?
- Does it really need to be done?
- Why is it done?
- Who does it? (including number, level and responsibility of staff).
- How much is there to do?
- How often is it done?
- When is it done?
- How much does it cost? including labour, supplies and equipment, space and other overheads).

Current operations should be described on a flowchart, that is, an item should be followed from the time its request is received by the library to the time it is fully incorporated into the library's collection and ready for circulation.

6. What are the strengths of the current operations?

7. What are the deficiencies in the current

operations? For example, where are the backlogs? What is an acceptable backlog? How can backlogs be reduced?

8. What additional services would the library like to provide but is unable to at present? What resources would be necessary to provide this additional service?

9. What is the size of the collection? The following should be taken into consideration:

- Number of titles (number of serials versus monographs/analytics),
- Number of volumes,
- Form of material, and
- Language.

10. What catalogs/files exist? The following should be taken into consideration:

- Divided/dictionary/classified catalog,
- Union catalog representing holdings of several libraries,
- Shelf list,
- Authority files,
- Size of each file/catalog, and
- Growth rate of each file/catalog.

11. What cataloging standards/rules are used? These include: descriptive cataloging, classification, subject headings, and filing rules. Are they adequate? Would they be suitable for use in an automated system?

12. What would be the motives in automating the library's operations?

- To increase the range and depth of service. The backbone of any library's operations is the bibliographic record. Once it exists in machine-readable format, it can readily be augmented, abbreviated, duplicated, or manipulated to produce a wide variety of products, such as specialized bibliographies, printed catalogs, and computer output microfiche (COM) catalogs.

- To improve speed and productivity.
- To reduce or reallocate staff.
- To reduce error.
- To improve control and dissemination.
- To facilitate cooperation, including cooperative acquisitions programs with other libraries in the same organization or geographical area, contribution to union catalogs, and the exchange of the library's data base with other organizations.
- To reduce the unit cost of operation.

Unit cost of operation can be reduced because repetitive manual tasks can be done by the system; the advantages of this include the following:

- Printed or COM fiche catalogs eliminate the need to file catalog cards.
- Catalog maintenance is simplified; any changes made to a record in the data base will automatically be reflected in the next update of the printed COM fiche catalog.
- As authority files are linked by a code to bibliographic records, any updating (e.g., change in the name of an organization) is done once only in the authority file and is automatically reflected when the code is expanded in the bibliographic records.

The systems study should formulate recommendations for improvements in the library's operations. If automation is recommended, management, the library and the systems personnel must consider the following:

1. Who will be involved in the design and development of the automated system? Is there sufficient expertise within the organization's library and computer personnel to undertake such a project on their own or will the services of a consultant be required?

2. What impact will the design, development and implementation have on the library's day-to-day operations? Will additional staff be required?

3. What are the implications of automation on the library's budget?

4. How long will the project take to implement?

PLANNING STAGE

Once management has made the decision to automate and to adopt MINISIS, and has provided the resources (staff, equipment, space, etc.) required to support the project, the following can then be considered:

1. What aspects of the library's operations will be automated? One possibility is to stop using the manual system at a given time and to start to automate the acquisitions and cataloging procedures. Order information is entered on-line and is used to produce computer-generated purchase orders. On receipt of the ordered item, the same record from which the order was generated is accessed again, from the cataloging point of view, to complete the descriptive cataloging and to add the subject headings/descriptors and the call number.

2. What types of documents (e.g., journal articles, monographs, serials, nonprint materials) will be included in the library's data base? As the acquisition and cataloging of monographs and analytics are quite similar, it is usual to treat them as a unit, i.e., as one subset of a data base. Serials are best treated as a separate subset as their ordering, cataloging and record-keeping differ significantly from that of nonserial items.

3. Which aspects will be automated initially and which will be phased in later? One could start with acquisitions and cataloging procedures and, once they are working smoothly, phase in serials. As circulation control and serials check-in are features currently under development for MINISIS, they should be kept in mind as future possibilities for automation.

4. What bibliographic standards will be adopted? There are three possibilities:

- The first is descriptive cataloging. If the bibliographic standard currently in use does not easily lend itself to use in an automated system, one may consider adopting "UNISIST-based" bibliographic description. Although MINISIS is not tied to one particular cataloging standard, it was designed to be compatible with the principles found in the "UNISIST Reference Manual for Machine-Readable Bibliographic Descriptions" (UNISIST/ICSU-AB Working Group, 1974). The UNISIST-RM is a standardized bibliographic exchange format which was designed primarily for the abstracting and indexing community, information centres and specialized libraries. Libraries that have adopted it include those of the Agricultural University of the Netherlands (Wageningen) and IDRC (Ottawa). They have adopted UNISIST tagging and subfielding but not the use of indicators. The UNISIST method of bibliographic description is based on the concept of bibliographic level (analytic, monographic, collective, serial) and is analytical in approach. Each data element (author, title, place of publication, publisher, date of publication, etc.) is entered according to its type rather than, as in the traditional approach, its function (main entry, added entry, etc.). UNISIST bibliographic description allows the library or information centre to be "liberated" from the concept of main entry and the card format.

- The second is subject cataloging. Consideration may be given to moving to more "in-depth" subject analysis, perhaps replacing subject headings with descriptors from a specialized thesaurus.

- The third is that of classification. A very specialized library or information centre may decide that it is not necessary to assign call numbers to the items in its collection and may choose to arrange its documents in order of record number (ISN or internal sequence number).

5. How will the library's data base be defined? The library must first determine the fields that it requires to accommodate the bibliographic data (author, title, ISBN, price, etc.). The contents of all the fields describing a particular document comprise the bibliographic record for the item (the analog to a "main entry" card). The total of all the bibliographic records comprises the library's data base.

If the library has chosen to adopt a particular cataloging standard such as UNISIST-RM, the majority of fields required will be found in it. However, it will always be necessary to add local cataloging and acquisitions fields. The exact requirements will depend on the library's needs. For example, if the library wishes to know at any point in time the total amount of its book budget that has been committed, a field must be defined to enter the estimated cost ("ECOST") of a document and another defined to enter the actual cost ("ACOST"). ECOST would be entered at the time the document was ordered and would contain an estimate of the price of the document; upon receipt of the document, ECOST would be deleted and the actual price of the document entered in ACOST. The amount of the current book budget committed is determined by first limiting the search to records generated during the current fiscal year and then adding the total of the amounts entered in the fields ECOST or ACOST.

Care must be taken to ensure that the same field will not be used to contain more than one type of data. All the fields and their characteristics are defined in MINISIS in a data definition. The characteristics of each field are specified, including:

- Field name (e.g., DATE OF PUBLICATION),
- Mnemonic (e.g., DATEP),

- Tag (e.g., A200),
- Maximum length (e.g., 40 characters),
- Whether or not the field is repeatable,
- Whether or not the field is subfielded,
- Necessity for system to prompt for entry of the field,
- Bibliographic level,
- Necessity for system to validate the contents of the field (e.g., for data which is also entered in an authority file), and
- Necessity for inversion (definition of "fast-access paths"); if yes, invert on-line, on RELEASE or off-line.

The total of the field definitions comprises a "user view" or a data base. A group of fields may be combined in different ways to provide several user views of the same physical data (e.g., "acquisitions" view, "cataloging" view, "reference" view).

In addition, a default-display format must be defined using the PRINT processor. This will be the format in which the record will be displayed when accessed for modification or retrieved in a search.

6. At what point will a record be entered into the system? In the case of purchased items and solicited gift material, a skeleton bibliographic record could be entered at the acquisitions stage and from this a purchase order would be generated. An automatic check for duplicate titles could be made on entry through an inverted file of significant words in the title (i.e., title keywords).

In the case of unsolicited gifts which will be retained, a skeleton bibliographic record could be created at the acquisitions stage, or the items could pass directly to the cataloger who would prepare a full catalog entry. In either case, at the time the record is first entered in the system, an automatic check could be made for duplicate titles.

The first alternative is preferable if there is a large cataloging backlog: it allows a skeleton entry in the system, and all items "in process" can be identified through searching the keywords in the title field. If the library has little or no backlog, the second alternative - a one-step process - is preferable.

7. Will each acquisitions assistant and cataloger enter directly on-line those records for which he/she is responsible, or will a worksheet be prepared from which data entry can be done later? If enough computer resources (e.g., terminals, CPU time, memory) are available, acquisitions records can be quite satisfactorily entered on-line, working from the original purchase request form. As well as the acquisitions fields, the acquisitions assistant need only enter enough bibliographic information to adequately identify the item (i.e., personal author, title, place of publication, publisher, date, collation).

Again, depending on the availability of computer resources, and whether descriptive and subject cataloging are a one-person operation, this would be done most efficiently on-line by the cataloger. Printouts of the records in a worksheet format would be generated in batch at the end of a session.

Proofreading would be done by the cataloger and any corrections required could be done on-line the next day.

8. What should be considered in designing a cataloging worksheet? Even if the decision is made to catalog on-line, it is a worthwhile exercise to design a cataloging worksheet and to experiment with it in cataloging a wide variety of publications. Although most of the fields required would have been decided on at this stage, it will likely be discovered that several fields need to be added to the data definition to adequately describe some of the "atypical publications" (e.g., reprint of a journal article reissued as part of a monographic series).

Completing cataloging worksheets is very useful for training purposes and will help immensely when designing print formats and preparing indexes.

9. What status codes will be required? It is always desirable to know at what point a record is in the ordering and cataloging cycle. This can be done by assigning a status code to each record and making this an inverted field. Following is a sample list of status codes:

OSENT -	order has been sent out
INACT -	inactive record, i.e., complete order, but item not to be cataloged as a separate record such as added copy, added volume, replacement copy
CLAIM -	claim notice sent
DELAY -	order delayed
RPART -	order partially filled
INPRO -	item received and sent to cataloging
SCANC -	order cancelled by supplier
LCANC -	order cancelled by library
PROOF -	cataloging data has been input but not yet proofread
NUACC-	record is ready to be included in next accessions list
RCMPL -	record has appeared in accessions list, and item is fully cataloged and is on the library's shelves, ready for circulation

One can readily determine the size of the library's backlog at any time by searching to find the number of records with the status "INPRO". In addition, these status codes can be used to define the subset of records in the data base that a user can "see" with a particular "user view".

10. What authority files will be required? The library may wish to develop authority files, such as the following:

- An authority file could be constructed to hold records for the library's book suppliers (publishers, jobbers or exchange partners), each of which would contain a unique code and the supplier's name and address. Only the supplier code would be entered in the bibliographic record at the acquisitions stage. The supplier authority file would be linked to the file of bibliographic records and, when purchase orders are generated, the supplier's name and address would be printed on the order form. The supplier code would not appear on the purchase order.

- An authority file could be built to contain records for frequently used messages to suppliers. Each record would consist of a code and a message. For example, "OPQT" could mean "Please search for this out-of-print publication and send us a quotation of the price". "OPQT" would be entered in the bibliographic record at the acquisitions stage and, when the purchase order is generated, only the message would be printed on the order form.

- An authority file could be built to hold the names of institutions and their locations. Each authority record would contain a unique code which would be entered in the bibliographic records for documents associated with a particular institution. Depending on the library's needs, the authority file could be used to enter corporate authors, and/or affiliations and/or performing organizations. A "user view" of the bibliographic record would be defined so that, for example, a library patron would see the name and location of the corporate author but not the code.

A complete record in a corporate name authority file (CNAF) could contain the following fields: authority code (a numeric or alpha-numeric code generated by the system on entry representing the name and location of the corporate body); corporate name (the form of name chosen as the authoritative entry in the CNAF); corporate location (city or town in which the corporate body is located); country (country in which the corporate body is located - the ISO two-letter country code could be used here); see reference from (from variant form(s) of name); former name (authority code representing the name, location and country of an earlier name of the institution); and later name (authority code representing the name, location and country of a later name of the institution).

- An authority file could be constructed to contain valid subject headings with their corresponding "see" and "see also" references. Subject headings could be validated on entry or at the time the record is released for searching by subject.

- If subject analysis is done using descriptors found in a thesaurus, the thesaurus structure (including the descriptors and their hierarchical relationships, the context in which they should be used, as well as the forbidden terms) would be built into the system.

- An authority file could be constructed to contain the valid form of an author's name and "see" references from the form(s) of the name not used.

- A stop-word list could be created to strip "noise words" (prepositions, conjunctions, pronouns, etc.) before words in particular fields are inverted. This is particularly important when title fields are inverted.

11. What inverted files will be required? Inverted files or "fast access paths" are created by extracting keywords from fields and making a list of records which contain each keyword. A keyword may be a word within the field, the complete field, or some part of the field which is delimited by special characters (e.g., /educational institution/, /self-reliance/, /Singapore/).

Although inverted files are a very useful tool for performing searches, there is some overhead associated with their creation (disc space) and their maintenance (CPU time and disc space to update record lists). Therefore, the library will have to judiciously choose the fields that it wishes to invert. It would be best initially to consider all the possibilities for inverted files and assign them a priority based on their potential use.

The inverted files that are most important would be created first and, depending on the availability of computer resources, those that are less important would be phased in later. Fields that could be candidates for inversion include: title (keywords only), subject headings/descriptors, fields containing a corporate authority code (corporate author, affiliation, performing organization), personal author, status, location, and date.

12. What type of catalogs will be required? What data elements will be needed and how will they be formated? How often will they be produced? Will supplements be required? One possibility is to produce computer output microfiche (COM) catalogs and to update them with printed supplements.

13. What impact will the automated system have on the filing of entries in computer-generated catalogs? In an automated system, groups of letters, numbers and words will file as they are written, not as they are spoken. Unless special sorting has been specified when generating the catalog, the following will apply:

- "U.S.", "U. S.", "US" and "United States" will not interfile;
- "1984" (as a title) will not file under "Nineteen";
- "Labor" and "labour" will not interfile;
- "XII" will file with words beginning with the letter "X" and not as "twelve"; and
- "Co-operation" and "cooperation" will not interfile.

In some cases, the library may choose to adopt certain conventions in entering particular types of data: for example, acronyms and initialisms could be entered as words with no periods or spaces between the letters. In other cases, it may be desirable to have special sort sequences written; for example, in generating a title index, all punctuation could be stripped off and spaces closed in so that titles containing hyphenated and nonhyphenated versions of the same word would interfile.

The library may decide that it wishes to adopt "word-by-word" filing, ignoring punctuation, which would be a departure from the traditional filing rules. This would mean that in a corporate author catalog, for example, "Singapore Manufacturer's Association" would file before "Singapore. Ministry of Defence". From the point-of-view of a user who is not a librarian, this makes more sense than filing all entries for government bodies entered under political jurisdiction before all other entries beginning with the name of the political jurisdiction. When deciding which traditional filing rules can be abandoned, the library should always consider the impact the change will have on its clients.

14. How will the retrospective conversion be handled? Assuming that it is decided to convert the library's existing catalogs to the automated system, the library must consider the following questions:

- Should the collection be weeded before the retrospective conversion takes place? If so, what criteria will be used?

- How and when should the retrospective conversion be phased in?

It would be best to have some experience in using the new system for current acquisitions before starting to tackle the retrospective records. There will most likely be "growing pains" during the first few months after the implementation of the system, and it is preferable to have any major problems solved before embarking on a massive retrospective conversion. The experience gained in using the system for currently acquired material will serve to make the conversion a much smoother and more efficient operation.

CONCLUSION

In conclusion, the following advice is offered to libraries embarking on an automation project:

- The success of the library's automation project depends a great deal on the interface between the library and the computer staff. If the library staff has had limited exposure to automated procedures, they will be very dependent on the goodwill and knowledge of the librarian to instill in the systems analyst a sense of "mission" for the automation project. Library staff must work closely with the systems analyst and ensure that he/she understands the library's needs and its procedures.

- The involvement of all of the library staff, including those in public services, should be maximized right from the early planning stages. It is particularly important to involve those who interface between the library and its clientele.
- At every stage of the planning process, decisions, and the reasons for them, must be documented.
- Training and procedure manuals must be written before the implementation of the automated system.
- The need for thorough planning cannot be overemphasized.

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INFORMATION CENTRES

SPECIALIZED INFORMATION ANALYSIS CENTRES

K.P. Broadbent

Scientific research and technological development can have an impact on society only if scientists exchange information with one another and if the results of research are adequately disseminated. These ideas and data are of course recorded in the form of scientific documents.

In the last century, there has been tremendous growth in scientific literature, resulting in "bottlenecks" in the handling of information. As the literature grows, it becomes increasingly difficult for researchers to absorb all the information that is being published on a given subject. Consequently, they need help if they are to be effective in their work and discover and absorb new ideas. It is not surprising then that the growth in published information has led to new information processing techniques and ways to exchange information.

The oldest means, however, is that of the so-called "invisible college". The "members" of this college are all closely connected colleagues, who freely exchange ideas by frequent contact with one another. In some scientific areas - mainly advanced ones - the invisible college is very effective because its members can afford to travel, attend meetings, make long-distance telephone calls, and widely distribute important papers they publish. However, in less well endowed technical fields, in areas of primary interest to developing countries, and among young postgraduates, it is not so easy to establish an invisible college or to draw on the resources of an existing one.

The Specialized Information Analysis Centre (SIAC), where documents are analyzed, abstracted and reviewed, is a substitute for the invisible college. It is open to all - rich or poor, established senior scientists or younger, less experienced ones.

The users of scientific information are now more interdisciplinary: the work of chemists and physicists overlaps in certain areas; agricultural scientists need information about biological subjects, etc. Information required by many scientists is "mission-oriented" as opposed to "subject-oriented".

COMPATIBILITY

When people view information sharing as a worldwide activity, they often acknowledge the need for compatibility among systems, and yet many create their own without regard for what is being done elsewhere. Compatibility must be considered at four levels.

Software and Hardware in Mechanized Operations

As information centres increasingly turn to mechanization to handle the masses of information that they have collected, the limits of information sharing imposed by computer packages are just beginning to be felt. Although the speed of technological change promises improved compatibility, centres that are considering mechanization should be concerned about the constraints on compatibility that are inherent in some packages.

Bibliographic Description

Most document citations contain a title, author, source, and pagination. The format of the information is usually not too important, as it is not difficult to determine which element is which. The problem is that searching by bibliographic description is not possible for someone who is looking for information on a particular subject - it is useful only for someone who knows the author or title of a document.

Data Description

Data are virtually meaningless if one does not know how they are collected, measured, and assessed.

Subject Description

The way that the content of a document has been described determines whether people who are looking for information on a particular subject will find the relevant materials. Compatibility of subject terminology is therefore of prime importance: it is the backbone of information retrieval.

SUBJECT SCOPE

The subject scope of a SIAC should be defined with precision before the centre is established. If the subject scope is too broad, the component parts will not be covered adequately and analysis will be difficult.

INFORMATION ANALYSIS

Researchers should consider information to be an essential part of the research process, for research and development cannot even be envisaged without the dissemination of results. Authors must therefore accept more responsibility for information links.

SIAC's should consist of knowledgeable scientific middlemen who contribute to science themselves, and who help assimilate and interpret the literature for others working in the same field. Compatibility of terminology is essential and should involve the development of common tools for indexing.

A SIAC should be comprehensive and up-to-date in its field. It should collate and review data, and provide users with a wide range of services.

A network approach may be identified in three possible ways:

- The SIAC may feed information by a major inventory-type service, such as AGRIS, out of which one can extract, for example, all "Sorghum" references that appear monthly and feed them for analysis to the SIAC.

- The "invisible college" served by the SIAC may constitute itself as a network to "feed" the centre choice items of information for dissemination (e.g., nonpublished data, news items for publishing in a newsletter), or to promote direct contact and opportunities for scientific discussion.

- The SIAC could have "branches" in other geographic or linguistic regions; for example, a cassava information centre in Asia could interact closely with the Cassava Information Centre at the Centro Internacional de Agricultura Tropical (CIAT) but provide unilingual material "downstream" to users and "upstream" to CIAT itself.

PRODUCTS AND SERVICES

Products and services provided by SIAC's include:

- Annotated bibliographies,
- Newsletters,
- Literature reviews,
- State-of-the-art reviews,
- Directories of research workers, research projects, and research institutions,
- Handbooks and manuals, and
- Question-and-answer services.

DOCUMENT DELIVERY

Document delivery - providing, on request, copies of documents covered by bibliographic services - is expensive but essential for a SIAC that produces bibliographies and offers question-and-answer services. The high costs of acquisition, photocopying, postage, and supplies are major constraints. In contrast, microfiche is relatively inexpensive to produce and is easy to disseminate at low cost. Its chief drawback is that one must set aside enough time - often during working hours - to gain access to a reader and then go through a document. A partial solution to this problem is the microfiche reader-printer, which allows information centres to send large documents long distances and permits users to obtain hard copy.

The International Livestock Centre for Africa (ILCA), which is located near Addis Ababa in Ethiopia, is one institution that has supported an innovative microfiche project. The information scientists and researchers at ILCA recognized that much of the information on livestock production in every African country was not easily accessible in published form: it was found only in nonconventional forms of literature such as government reports, monographs, and theses. ILCA designed a project whereby consultants or ILCA staff members at regional and country centres select relevant documents to be microfiched in each country; the microfiche team then visits the research institutions, libraries, and government offices to put the documents on microfiche; the film is processed at ILCA and jacket fiche are produced. The master copy is kept in the holdings of ILCA, a copy is sent to IDRC as backup, and a copy (along with a microfiche reader) is sent to the institutions that were visited in a particular country. The bibliographic data for each microfiched document are input onto a special data base that ILCA staff have created, using MINISIS. ILCA used AGROVOC, a newly developed thesaurus for AGRIS, as the framework for the indexing terms related to livestock breeds and livestock production. Hard copy and microfiched indexes are produced and distributed.

Although certain document delivery services may never be cost-effective, they should be recognized as one of the most important functions of a SIAC.

TYPES OF INFORMATION CENTRES: SPECIAL - AN OVERVIEW

M. Beckman

POLYSAR

Description of Parent Organization

Many businesses or corporations in Canada and the United States have what is called a "special" library or information centre, particularly at their headquarters or central location where research and development is most likely to occur. These information centres vary greatly in size and in services offered, depending on the importance that the president or senior executives of the organization attribute to information as a centralized and organized commodity. To illustrate the variety of services offered and types of problems encountered, a specific information centre in a Canadian chemical processing company will be described.

This international company, which is called Polysar, is engaged in the fields of synthetic rubber, latex, plastics and petrochemicals, with headquarters in a small southern Ontario city. It has marketing, manufacturing, and service facilities in many other countries, including in the United States and Europe. The company is active in technological innovation and in developing new products and applications: research and development is therefore an important component of its overall mission.

Mandate of Information Centre

The information centre for Polysar is located in the research and development division at the headquarters plant. It primarily serves about 1000 professional and technical staff in the research and development (R&D)

division, but also has responsibility for supplying information and services to all other units of the company if required. The information centre's objective is to specialize in the collection, organization, maintenance, storage, retrieval and dissemination of internally and externally produced published information in all subject areas of interest to Polysar's international clientele.

The information centre reports to the Manager of Technical Facilities, who in turn reports to an Assistant Vice-President: thus, the information centre is separated from the executive of the company by three levels of management, and it is not represented in policy or planning matters. It has its own budget, but must pay other units of the company for services (telephone, mail delivery), just as other units are charged for information services.

Typical Services Offered

Most of the services of the information centre involve the collections, which consist of approximately 22,000 monograph and serial volumes and 50,000 reports (Table 1). The size of the collection increases at the rate of about 1000 volumes and 3000 reports per year, and is controlled by weeding to storage or transferring to microfilm.

Ready reference work

This service provides answers to specific questions, such as the address of a company official, the products manufactured by a company, the capacity of a plant, or the boiling point of a chemical. An up-to-date collection of handbooks, dictionaries, directories, manuals, encyclopedias and other documents is maintained and used by centre staff to immediately answer these questions.

Information searches

Information searches are more comprehensive, often requiring hours to complete. They may deal with a very complex topic, a general one that needs reviewing and updating, or one that may not have been

Table 1. Collection of the Polysar information centre.

Format	Numbers
Books	12320
Surveys and studies	225
Serials:	
Subscriptions	925
Bound volumes	5000
Microfilm	1750
Reference:	
Books	750
Chemical abstracts	550
Cumulated indexes	250
	21770
Reports[a]	50000

[a] Includes: internal company, market research, visits to industry, tire analyses, courses and films, country files, general file, specifications and standards, government regulations, trade literature, company files, Energy Board, National Science Council.

researched. The search will bring out the information available on the subject or verify the lack of such information. These searches should be an essential preliminary to any project undertaking. The originator of the search must either put the request in writing or discuss the search with information specialists in the centre. Most frequently these searches are conducted using on-line retrieval from either local or external data bases.

These searches can be categorized under five different headings:

- The commercial information search, involving answers to business and market topics, such as production and consumption figures, data on sales commodities, financial information on companies;

- The trade literature search, dealing (in this case) with hard-to-find information on suppliers and competitors' products, specifications, etc.;

- The scientific and general technical information search, which covers a very broad field and includes such topics as patents on a particular polymer process, polymer synthesis and reactions, pollution, or toxicity;

- The internal company report information search; and

- The managerial information search.

All of these require special searching expertise, which the information centre staff has. Several terminals are available for accessing scientific information data bases, particularly those available through the Canadian Institute of Scientific and Technical Information (CISTI).

Circulation

Books and miscellaneous publications are circulated on request and most periodicals are available on automatic circulation. Because of the heavy demands for this service, the centre limits the number of titles that a user can borrow to 20. A list of "Journals Received on Circulation" is automatically forwarded to each individual annually to check the accuracy of circulation.

Bulletin services

To inform staff of current information available to them in their particular field, the following bulletins are prepared and distributed to Polysar personnel:

- The Information Bulletin is prepared weekly and contains abstracts of current information from journals, trade literature, studies, etc. in the scientific, technical and commercial fields of interest to the company. It is distributed to all company personnel on request and to a limited number of external groups by special arrangement.

- The Technical Reports Abstracts Bulletin is prepared monthly and contains abstracts of technical reports and memos prepared by the Rubber Division groups. Distribution is restricted to designated personnel within these groups.

- Accessions Bulletin is prepared bimonthly and lists new books, reports, studies, etc. received during the period. It is distributed to all Polysar personnel on demand.

Information is requested from any of these bulletins by submitting the form provided at the back of each bulletin. Staff members check off the article wanted, return it to the information centre, and a photocopy is made and routed to them almost immediately.

Purchase

Books, periodicals, government reports, studies, specifications and other published literature that are required on-site, either by the information centre or by departmental groups, can be obtained through the information centre. Affiliate company groups may purchase special items or texts not easily available through their own purchasing office. Information on publishers, titles, prices, etc. is provided by the information centre to all personnel. Items retained in the information centre or in other departmental locations on-site are indexed for retrieval.

A special request form is available to simplify the purchase procedure.

Interlibrary loans

Items or documents not held in the information centre can be borrowed from sources such as the National Research Council Library, CISTI, university libraries, public libraries, and other company libraries through an interlibrary loan service. Most of these loans are for periodical articles, which are usually processed via photocopies. Book loans are less frequent and are normally for a 2-week period.

Again, a special request form is available for this service.

Memberships

Company memberships are ordered and renewed through the information centre. An up-to-date list of these, under company or society name, will give all the details as to price, renewal data, company member(s), etc. It is maintained in the centre and information is available on the subject at all times.

On-line local data bases

The information centre has created several machine-readable files of indexes or information particularly relevant to the needs of company staff:

- Internal company reports,
- Trade literature information, dealing principally with products from competitor or supplier companies,
- Commercial surveys and studies,
- Polysar papers, and
- Records of visits to industries.

The information centre is heavily involved in the application of new technology. It uses a locally designed automated system based on a data-base management system called IQ/net. The capabilities of this system are as follows:

- It allows for a completely integrated automated system for all the functions performed in the information centre.
- It allows for form and report generation. (For example, it prints purchase orders and catalog cards.) It is used for the production of monthly, semiannual and annual reports.
- It allows for sophisticated on-line retrieval, including controlled vocabulary (thesaurus), natural language, and proximity searching (i.e., words in the same sentence, same paragraph, etc.).

- It provides management statistics, such as usage statistics, budget and accounting statistics.

The information centre also uses Wang word processors for clerical and secretarial functions.

Staff of the information centre at present is 15, including the supervisor, three information specialists, three technicians and eight clerical assistants. Three additional staff have been requested so that the analysis, synthesis and evaluation of information can be assumed as normal duties. A patent information specialist is also required.

CONSTRAINTS ON OPERATION

The problems of the information centre at Polysar are not unusual for any information centre or special library. The three main problem areas are as follows:

- The centre and its staff lack authority due to two factors. The first is the reporting level of the centre supervisor, which is too low in the company hierarchy to have any impact on planning or decision-making. The second is the credibility of the staff itself. Unlike managers whose competence is readily recognized throughout the company, the status of information specialists or librarians does not command attention and respect. This means that the function of the centre - provision of information - is not taken any more seriously than the staff who provide it, and the information centre supervisor must constantly fight for budgets, staff, space and recognition.

- Lack of space is the second serious problem. It is a problem common to most information centres of this type usually because the centre is in a shared building and insufficient space has been provided for the expansion of staff and collections. The Polysar information centre was given an entire floor (575 m^2) when the Research Division building was erected 15 years ago. It is now so crowded with collections, staff, and computer-related work stations that there is hardly any room for users. An additional 370 m^2 is urgently required but there is no place to which to move. A temporary solution has been to use a storage room three floors away: compact shelving will accommodate almost half the present collection, allowing reader spaces to be reinstated. The only real solution is for the information centre to be given 925 m^2 in a new building, which unfortunately might not be as close to its primary clientele as it is at present.

- Special information centres tend to be isolated from other similar centres: consequently, they do not learn from one another's experiments and experiences as academic libraries do, for example.

TYPES OF INFORMATION CENTRES: REGIONAL - AGE AND OTHER REGIONAL INFORMATION CENTRES ESTABLISHED BY THE ASIAN INSTITUTE OF TECHNOLOGY, BANGKOK, THAILAND

Hwa-Wei Lee

Regional information centres exist in many shapes and forms. Some of them may be national or institutional in origin but have regional information services as their goals. Others may be founded as a multinational project by cooperating agencies in several countries within a geographical region. There may still be others which act as a regional node of an international information system. Examples of these found in Southeast Asia include:

- Asian Information Centre for Geotechnical Engineering (AGE), established and operated by the Library and Regional Documentation Centre, Asian Institute of Technology, Bangkok, Thailand;

- Southeast Asian Medical Information Centre (SEAMIC), a project of the Southeast Asian Medical and Health Organization (SEAMHO); and

- Agricultural Information Bank for Asia (AIBA), which serves as a regional centre of the International Information System for Agricultural Science (AGRIS) sponsored by the Food and Agriculture Organization of the United Nations (FAO).

An interesting method of sharing resources, which is now fully developed in several regions of Asia, is the establishment of specialized information centres that focus on specific "products" (commodities) or "missions" of high priority and that have a regional responsibility for the collection and dissemination of information (Volls and Sonboonkun 1982).

Product orientations include:

- Ferrocement (Thailand),
- Rubber (Malaysia),
- Coconut (Sri Lanka), and
- Rice (Philippines).

Mission orientations include:

- Agriculture (Philippines),
- Geotechnical engineering (Thailand),
- Cholera (Bangladesh), and
- Packaging materials and techniques (Hong Kong).

Experience suggests that it is best to locate regional information centres in leading regional or national institutions or universities with a strong involvement in the relevant subject areas, as well as a strong library resource. The subject expertise available in these institutions or universities, together with their commitment to further information service in the region, provide the basis for success. Outside funding is often essential to subsidize part of the operating costs for a number of years until these centres can become independent of user fees and other funds.

THE LIBRARY AND REGIONAL DOCUMENTATION CENTRE, ASIAN INSTITUTE OF TECHNOLOGY: A CASE STUDY

Background and Mission

The Asian Institute of Technology (AIT), located in Bangkok, Thailand, is an autonomous regional institution founded in 1959. Governed by an international board of trustees and supported by governments, foundations, and business corporations from all over the world, the central mission of AIT is to serve developing countries in Asia through postgraduate education and applied research in engineering, science and allied fields, and through the activities of its academic centres in the fields of information services and computer applications.

Within this framework, AIT's Library and Regional Documentation Centre (LRDC) has set out to build library collections and to develop specialized regional information services employing modern techniques (including computer applications) in information processing, storage, retrieval, repackaging, and dissemination. Since 1973, LRDC has established four mission- or product-oriented information centres that provide timely and relevant information to users in Asian countries and the world over. In addition to providing specialized information services, LDRC has also served as an excellent training facility in Asia for library and information science workers; it has participated and cooperated in national, regional and international projects, and has acted as a consultant to other libraries and information centres.

Specialized Information Centres and Their Services

The four centres

The four specialized information centres established within LRDC are:

- The Asian Information Centre for Geotechnical Engineering (AGE), founded in 1973 with financial support from IDRC in Canada;
- The International Ferrocement Information Centre (IFIC), founded in 1976 with financial support from the Government of New Zealand and from IDRC;
- The Renewable Energy Resources Information Centre (RERIC), founded in 1978 with financial support from the Government of France, UNESCO, and U.S. Agency for International Development; and
- The Environmental Sanitation Information Centre (ENSIC), founded in 1978 with financial support from IDRC.

Variety of information services

Although each of the centres has its special goals, objectives, and characteristics, they all provide a similar range of programs and services. For example, AGE offers the following programs and activities (Lee 1975):

- It searches, selects, and acquires both published and unpublished literature on geotechnical engineering which are relevant to Asia (including soil mechanics, foundation engineering, rock mechanics, engineering geology, earthquake engineering, and related topics).

- It maintains a computerized data base for the relevant literature, completely indexed and abstracted for easy retrieval. Both the International Geotechnical Classifications System (IGC) and the Soil Mechanics Thesaurus are used. Currently, the AGE data base holds about 25,000 bibliographic records.

- It disseminates information on available literature through the following publications: AGE News (v. 1 - 1977, Newsletter, 4 issues/year); AGE Current Awareness Service (v. 1 - 1973, Journal contents and new acquisitions, 4 issues/year); Asian Geotechnical Engineering Abstracts (v. 1 - 1973, 2 issues/year); AGE Digest (v. 1 - 1978, printed version of AGE data base, which is also available for sale); AGE Journals Holding List (4th ed., 1980, updated every 3 years); AGE Conference Proceedings Holding List (3rd ed., 1978, updated every 3 years); and AGE Research Technical/Special Reports Holding List (2nd ed., 1979, updated every 3 years).

- It provides the three "R" services (Reference, Reprography, and Referral) to members and others.

Fees and charges

Because of the financial subsidy from IDRC, AGE has been able to provide the above publications and services to its users at a modest cost. The membership fee charged to members from developing countries is a

Table 1. AGE membership fees (US$) for 1981/82.

Country	Fee for individual	Fee for institution
USA, Canada, Brazil, Mexico, Europe, Australia, New Zealand, Japan, Kuwait, Saudi Arabia, United Arab Emirates, South Africa, Nigeria	45	95
Hong Kong, Singapore, Korea, Taiwan (RCC), Iran, Iraq, Israel	30	65
All other countries	23	46
Supporting members		150

particular bargain. Membership and service fees are illustrated in Table 1.

Individual members receive one copy of all issues of AGE publications. Institutional members receive two copies of all issues of AGE News and AGE Current Awareness Service and one copy of the other AGE publications.

Experiences gained

According to a recent article in the Agricultural Information Development Bulletin (Tam and Valls 1982), the experience of the four information centres can be summarized as follows:

- A dynamic information centre can devise its own unconventional methods of information collection, processing and dissemination so that it can readily adapt to new situations and requirements.

- Information in a library will be insufficiently used and, to a large extent, wasted if not properly disseminated by an information centre. On the other hand, an information centre should be able to make use of and enrich the extensive collection of a library, which it cannot build up with its own means.

- The flow between an information centre and its users should be two-way: the collection at the information centre becomes richer, and the users in turn can benefit much more from it.

- Setting up small specialized information centres that focus on a specific commodity or mission is an efficient way of meeting some high-priority information needs of developing countries. Such centres require only moderate financial resources, particularly if available resources and facilities are pooled and shared.

- Operating in a developing country where the costs of living are low can substantially reduce expenses.

Promotional materials

Examples of selected announcements for four information centres operated by the Library and Regional Documentation Centre, Asian Institute of Technology were given.

REFERENCES

Lee, Hwa-Wei. 1975. The experience of a specialized information service in Asia - AGE. Journal of Library and Information Science, 1(2), 82-93.

Tam, D.M. and Valls, J. 1982. Modern information transfer. Agricultural Information Development Bulletin, 4(2), 5.

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FUNCTION, PLANNING AND MANAGEMENT OF INFORMATION CENTRES

M. Beckman

DEFINITION

Libraries have historically been known as depositories for books and journals, whereas information centres are viewed as being more dynamic - involved in the analysis, synthesis, transmission and repackaging of data. The operation of current awareness systems, in which data of potential use to a particular client is abstracted from its source and sent directly to the client, is certainly not a service that public and academic libraries could contemplate. However, within academic or public institutions, there are elements of this specialized and personal service, as new technologies allow them to become more involved in this type of activity. Therefore, the original distinction between libraries on the one hand and information centres on the other is no longer valid, and in all my presentations, I use the two terms interchangeably.

Information centres exist in many types of organizations. Some of these (with Canadian examples) include:

- Government ministries (Department of Agriculture),
- Government agencies (Canada Energy Board),
- Financial institutions (Bank of Canada),
- Industrial companies (Imperial Oil Co.),
- Museums, galleries (Art Gallery of Ontario), and
- Architectural firms (Project Planning Assoc. Ltd).

In many instances, these centres are very limited and are not unlike traditional libraries. However, in commercial organizations (such as oil or chemical companies) that have a strong research and development component, the specialized, in-depth personal service of an information centre tends to be more common.

In any case, any organization will have either a library or an information centre if information is a basic element of the organization's mission and services (such as research and development, economic analysis, government and clientele services). Therefore, the existence of an information centre depends not on the size of the organization, but rather on the type of clientele served. As well, the possibility of purchasing information services is now an option which must be considered. Frequently, however, it is the staff in the library who have contact with the commercial information market: without that link, the possibility of purchasing information might not be explored. An organization's need for a library/information centre can be defined according to the number of problems that the organization is likely to encounter that require information as the solution.

PROBLEMS IN INFORMATION CENTRES

Studies in Canada have revealed that a variety of problems are common to the libraries/information centres in many companies and government departments. Although these problems do not necessarily exist in all such centres, a discussion of some typical problems may be useful.

Awareness

The potential users of the centre are frequently unaware of its services, collections and facilities. Some see the centre only as a place to obtain background information or to support recreational or personal interests, but not as a dynamic service relevant to their operational needs.

Bypassing Centre Services

In many instances, the centre may be providing a useful service that company personnel are bypassing because of unfortunate experiences in the past. This is true of the periodical routing service, which many centres still operate. This system tends to break down when one user keeps periodicals on his/her desk: the resulting delay leads to dissatisfaction with the service because timeliness is the very essence of the service. The dissatisfied user or his/her department then solves the problem by subscribing directly to the periodical using company funds, and setting up another but informal routing system in the department.

Individuals, groups and departments also tend to acquire information or resources directly from the source, without reference to the information centre, its acquisition budget, or its technical processing. The cost is buried in each department's miscellaneous budget, and little attempt is made to keep track of materials so acquired. This means that the financial resources of the company are being depleted without benefit to the entire company - which would occur if all acquisitions were routed through the information centre.

Specialization and Credibility

Users frequently feel that the information they require is too specialized to be available from the information centre. The credibility of the centre staff is challenged, for users question whether a specialized educational background provides the staff with adequate knowledge of the discipline involved.

Level or Classification of Information Centre Staff

Related to the staff's lack of credibility is their classification within the company or organization. It is not uncommon for information scientists to be placed at a lower level than managers or "bench" scientists practising their discipline. Unfortunately, this compounds the credibility problem described above.

FUNCTION OF AN INFORMATION CENTRE

The function of an information centre is to satisfy the recurring demands for information within an organization. It is not always easy, however, to state the goals of the centre independently of those of the parent company or institution.

The managers of information centres play a key role in formulating goals. They must understand the environment in which they work, and the objectives, plans, and policies of the parent company. Although these are not always stated formally, the manager must have some sense of the company's overall direction before establishing formal goals for his/her own operation.

A library or user committee may be a useful mechanism to assist the manager in goal formulation: the more widespread the involvement of interested users, the greater will be their acceptance and understanding of the library's purposes.

Having established goals (which are long-term) and objectives (which are more specific and short-term), the next task is to define the policy or functions that will determine how resources are to be allocated to satisfy the goals and objectives. Thus, the selection of goals and objectives and the assignment of priorities to them are the first steps in effective management. The definition of priorities is then translated into resource allocations - both staff and operating funds - for each objective.

PLANNING

Planning is the activity that takes the policies and defines the requirements - for procedures, tasks, and regulations - to fulfill them. Deciding how a particular activity should be performed so that it meets the needs of the user (i.e., the objective of the information centre) is the prerogative of the manager. In the planning process, he or she will consider all the alternatives, bearing in mind time and cost constraints, so that the policy priority is met. Here is a concrete example:

> Objective: To keep the users in the research division aware of current research activities in other similar companies.
>
> Policy: A current awareness program will be an important part of the information centre program.

Plans: Alternative 1

An automated current awareness system will take all relevant research information from whatever source and convert it into machine-readable form, with appropriate codes and indexes. Mounted in an on-line retrieval system, this data base will be used by the users, i.e., research scientists, through terminals in their laboratory. The retrieval system will be "user-friendly", so that simple instructions are all that are necessary to access the system successfully. Connecting printers will allow the user to print out any information that he or she wants to retain from the data base.

Personnel needs: 1 information scientist to select material for input, index or code, etc., and to interface with users; 1 technician to input the data and manage the data base.

Equipment: microcomputer, software program, terminals for users, printers.

Operational costs: computer and terminal maintenance.

Plans: Alternative 2

A current awareness system based on photocopies of documents, tables of contents, or abstracts of relevant material contained in documents will be available in a timely fashion to all research scientist users. A simple form on the circulated material will allow them to order photocopies of any material they require.

Personnel needs: 1 information scientist to select material and prepare abstracts; 1/4 clerk to photocopy and distribute the material.

Equipment: standard office equipment, i.e., typewriter, photocopier, etc.

Operational costs: photocopier maintenance.

Comparative Costs: Alternatives 1 and 2

It should be apparent that Alternative 1 is more expensive than Alternative 2. However, Alternative 1 would have a permanent product, that is, a data base of information relevant to the research of the company, which could be maintained and used indefinitely. The products of Alternative 2 are not as readily maintained and would be difficult to retrieve for future use. A decision would have to take into account user preferences, the value of the data base, staff availability for this project as compared to another, and so on.

Since there are different requirements (including staff) for each alternative, more than just the manager should be involved in the planning process. Discussions should take place with senior staff until the right decision is reached. The plan chosen is then translated into specific procedures, tasks, activities, etc., with a timeframe for completion. Part of the planning process provides a means for monitoring progress of the implementation of the plan.

The planning process is a continuous and comprehensive activity. The manager must envision such elements as the range of services the information centre is to provide, who is to be served, and what techniques are to be employed. He or she must be constantly aware of changes in the parent organization that may have implications for the centre's plans. The manager must also decide how far ahead the planning should be done, and in how much detail. (This may also depend on directives or policies of the parent organization.) In the planning process, the manager will be balancing a variety of conflicting requirements from users, the parent organization, and from the centre staff.

In a well-managed information centre, plans are made as far ahead as is practicable, so that there is sufficient time to deal with anticipated problems such as budget reductions, or with changes such as the introduction of new technologies. Otherwise, it is "crisis management": the manager responds to a change or problem often with less than the best procedures, and with more cost and less effective results.

OTHER COMPONENTS OF MANAGEMENT

Personnel

Employee participation in management has been an important issue in Canadian management discussions for the past decade. This is because of the theory (identified by McGregor) that there is a positive correlation between productivity and job satisfaction. Staff need to be informed about what is happening in the centre and the parent organization, particularly under conditions of change. This gives individual employees a sense of belonging and commitment, which then increases the probability of successful response to change.

One of the dangers in designing a staff structure for the information centre personnel is the tendency to build it around the personality of an individual employee. This happens much more frequently than it should because it seems simpler to change the organization than to change the person. It may result in greater difficulty in training support staff, an overemphasis on personality, a reduction in coordination, and an increase in friction.

Leadership

One of the most important aspects of management is leadership. Leadership is difficult to define because it depends on the personality of the manager - his or her management "style". Two managers may both perform the various administrative functions excellently but in a different fashion, for example, one may be formal, the other informal, and the employees may respond more positively to one style than the other. A leadership role is demonstrated to the staff by the manager's commitment, knowledge, experience, imagination and concern. In the past few years, recognized expertise in the technical side of the information function has also played an important part.

Budgeting

Budgeting - the financial aspect of the planning process - is recognized as an important aspect of management. As was discussed earlier, costs are assigned to alternative plans, and one plan is chosen. When all the plans for all projects, services, etc. are compiled, together with their anticipated costs, the result is a budget.

If a target budget is assigned to the information centre - that is, if the parent organization defines the total expenditure for various budget components, such as staff, equipment, materials, and operating supplies - then budgeting consists of adjusting the centre's plans to the money allocated. The budgeting process, therefore, assigns resources to plans, usually on an annual basis.

During the year, the manager or (depending on the size of the information centre) his or her business officer carefully monitors expenditures in comparison with the budget. Failure to match the budget may mean failure of the plans, at least to some extent. If the planning and budgeting processes are successful, the optimum use of resources will be made in achieving the goals and objectives of the centre.

Scientific Management

In addition to the behavioural considerations of management - personnel, leadership style, organizational structures - there is a growing interest in what are called the scientific aspects of management. These include time and motion studies, flowcharting and diagraming, work flow and processes, methods analysis, and other procedural elements of management. Without discounting the value of these techniques, they are only one factor in the total management picture and should not be viewed as the answer to all problems.

What is really wanted is the answer to two questions:

- How does the program of the information centre and its results meet the requirements of the parent organization?

- How do the results compare with the most effective possible use of available resources?

The issue then becomes one of measuring the effectiveness of the information centre, which must be done periodically based on quantitative and not subjective measures. These will be discussed in more detail in a presentation later in the course.

New Technology

New technologies, particularly automation, are a part of technical or scientific management. Because this also will be discussed by other lecturers, I want to identify the problem facing the manager: that is, the manager is not proficient enough in the new technologies to be able to make the necessary choices, decisions, and resource allocations without depending entirely on a technical expert in the information centre or parent organization. In the smaller information centre, it is too frequently the technical expert from the computer group in the parent organization who defines for the centre the type and design for implementation of automation. With little or no knowledge of automation activities in the library or information science field, the computer group reinvents the wheel, spending endless hours designing something already available, and frequently not doing it as well. The central computer group may also want to maintain control by using a large central computer (which tends to be costly for information data processing) rather than a function-oriented microcomputer.

The manager, therefore, must be sufficiently knowledgeable to supervise the specification of design requirements for any automated system and to be able to interpret the results of alternative design methods. If the manager is not able to, he/she may wish to use an independent consultant specializing in automated systems for information centres. Cost-effectiveness should be an important part of the evaluation of the alternative designs or proposals. Too often automated systems are implemented with unnecessary additional costs for the entire process. The manager who understands the new technology and the techniques for measuring its effectiveness will be successful.

ORGANIZATIONAL STRUCTURES OF INFORMATION CENTRES

M. Beckman

DEFINITION

For the purpose of this presentation, an information centre is viewed as performing the functions of both the traditional library and the more specialized information centre. That is, in addition to collecting documents - books, journals, reports, patents, etc. - the centre also analyzes, interprets, or synthesizes the information contained in the documents and makes it available to the clientele in new or more useful formats.

OBJECTIVES

The objectives of an information centre vary according to the mandate assigned by the parent institution. For example, an academic library's objectives relate to the teaching and research programs of the university: they include instructing students in the use of the literature and access and retrieval methodologies, as well as meeting information needs which obtain for all libraries. It may be, therefore, that the institution has defined either very broad or very specialized objectives for its information centre: that centre must respond with requirements or functions to meet those objectives.

The institution's objective in establishing a centre is to create the most effective mechanism for collection of resources and of staff trained to disseminate or transfer information from that and other collections. An information centre is seen as a coordinated plan for resolving the institution's information problems and for contributing research materials and technical skills to the decision-making process.

The importance of eliminating costly duplication by means of a centralized information centre should not be overlooked as an institutional objective. In institutions without a library or information centre, books, journals and technical reports are often acquired in abundance for specific individuals, but elsewhere in the organization such material is unavailable. Documents are received and not retained; at different times in different departments, similar materials are ordered, received, paid for, handled, stored, reordered, etc. If a central information centre exists, all duplicate paperwork and accounting costs are eliminated.

The information centre's goals or objectives must relate to those of the institution, but they also shape the centre's internal processing and match the centre's performance to the needs of its users. Because it is not possible to achieve all objectives simultaneously, priorities must be established and resources allocated accordingly.

ADMINISTRATIVE LOCATION WITHIN THE INSTITUTION

The effective operation of an information centre is often directly related to the level at which the centre reports within the organizational structure of the parent institution. For example, it may report to a manager 10 levels removed from the executive director of the institution, or it may be at the executive level itself, with the information centre manager an aide of the top executive.

There is no question that the information centre should report to a high level of management. Unfortunately, a common location is as a subunit of the research department: this tends to discourage the centre being used by other departments within the institution because it is viewed as being supportive of only research.

The rationale for placing the centre as high as possible within the hierarchy of the institution is based on the following objectives:

- To encourage a sympathetic managerial attitude and the acceptance and full use of information centre services;

- To keep the needs and achievements of the centre constantly in front of senior management;
- To avoid the danger of being associated with only one department;
- To obtain sponsorship by a member of the senior executive; and
- To relate budgetary requests to financial management of the institution.

PHYSICAL LOCATION WITHIN THE INSTITUTION

Although not as important as the location within the organizational structure of the institution, the physical location of the information centre may have a real impact on the effectiveness of the service offered. There are several factors to be considered regarding the physical placement of the library or information centre.

Centrality

The centre should be close to its primary clientele within the institution. In a large organization with several buildings, a separate building for the research division and the information centre is not uncommon. However, this frequently isolates the centre from other clientele within the institution and from the central administration of the institution as well. This isolation has the same implications as the organizational placement discussed above.

In a single building the problem is not as complicated. It is preferable to use a location that is central to all functions of the institution and yet close to its primary clientele.

Access

In spite of a good central location, the information centre may be hampered by poor access. For example, its entrance may be at the back of a floor, away from stairwells or elevators, or it may be through another department. A flight of stairs with no elevator may also be a hindrance for those not willing or able to climb stairs.

Relationship to Other Departments

An information centre should also be placed in proximity to other areas that employees of the institution regularly use, such as computer services, central reproduction services, cafeteria or lunch room, and personnel services. An attractive entrance welcoming clientele to the information centre on their way to another service can be very useful.

Service Access

The information centre must have access to the service facilities of the institution, such as a delivery entrance and exit, and garbage services because an information centre has an unnecessarily heavy requirement for the delivery and removal of paper and documents.

Security/Control

The information centre must also be located so that it is possible to provide security for entrance and exit. It should not be possible for employees to pick up material and leave the centre via elevators or stairwells without exiting through a control point.

Environment

The information centre should not be located so that noise from adjoining departments intrudes. Although proximity to a cafeteria, for example, may be desired, smoke or noise may unfavourably affect the research and study functions of the centre itself.

Another environmental factor to be considered is light. Because of the advantages of natural light, a location on the periphery of the building is preferable.

Summary

With so many requirements for physical location, it should be obvious that compromises will have to be made. However, careful site selection will avoid dilution of an information centre's resources: if possible, the centre should be placed centrally, close to its most important clientele and to heavily used services.

STAFF ORGANIZATION

There are many ways of organizing the staff within the information centre, depending on the size of the centre and the complexity of the program required by both the institution's and the centre's objectives.

As can be seen, centres vary from those similar to traditional library structures (primarily responsible for material handling) to very specialized ones that emphasize the analysis, identification and dissemination of information within documents.

They also vary according to the management style of their director. An authoritarian manager has a hierarchical structure, with authority moving firmly down the line from senior staff. A manager with a more consultative style allows decision-making to occur at the operational level, with senior staff acting in an advisory capacity.

Within organizations of any size, there are different levels of staff. These can usually be classified as professional, technical, and clerical.

These are discussed in more detail in a later session; but it is important to note here that the classification of staff within the information centre must relate to that of staff in other departments of the institution. Too frequently the level of the information centre professional staff is viewed as being somewhat lower than the level of the scientists, economists or others working as professionals in a particular discipline, rather than with the information pertaining to it. This can be a serious problem for the information centre, as too low a level of classification reflects on the credibility of the centre's function, on the authority of its decisions, as well as on its ability to attract the most qualified people to work as information scientists.

SERVICES RELATED TO USER NEEDS

The information centre has to respond to two directions: one from the management of the institution, and one from the users. It is important to maintain communication links in both directions.

One useful communication mechanism for doing so is the User Advisory Committee, which is made up of representatives of the various departments served by the centre, and reports to a member of the senior executive, not to the centre manager. The User Advisory Committee can serve the following useful purposes:

- Provide a relationship between the centre and the various components of the parent institution;
- Provide a useful internal political mechanism for gaining budgetary support;
- Assist in identifying subject areas to be developed in the program of the information centre;
- Provide liaison with management in the decision-making process; and
- Provide means of communicating the goals and programs of the centre throughout the institution, as well as up to senior executive levels.

The User Advisory Committee provides a sounding board for the information centre in relation to existing programs or the planning of new services. It can also assist in the implementation of a user survey. User surveys are extremely useful in assessing the success of existing centre services and identifying the need for new ones. They can be distributed to every potential user in the institution; and if they are designed for quick response to simple questions, a positive return should be assured. If space for comments is included in the survey, those who have more time can provide useful suggestions for new services or ways of improving old ones.

Without this input from users, either through the Advisory Committee or a survey, the information centre is in danger of losing contact with the main purposes and developments of the parent institution.

NEW TECHNOLOGY

For an information centre to carry out its role effectively, it must be sensitive to the potential uses and applications of modern technology regarding information. Unfortunately, this may depend upon the parent institution's policy of centralization or decentralization of computer services. If a centralized policy is mandated, the information centre may have methods imposed that are appropriate to the automation of other functions but not to the requirements of information organization, retrieval and dissemination. Another difficulty with the centralization of automation functions is the tendency to use mainframe or large computers as opposed to miniprocessors or microprocessors, which are much more suitable and cost-efficient for libraries.

If possible, then, the information centre should control its own technology program: it should have specialized staff trained in appropriate computer systems design, and in-service training programs for the entire centre staff so that they are all familiar with the new technology. The centre's ability to control its own technology may relate to some of the points discussed earlier, such as the manager's level within the institution's organizational structure, and the centre's credibility.

FINANCIAL CONCERNS

Just as new technologies relate to organizational structure, so do budget and finance. Too often (at least in Canada) the parent organization gives centralized authority for the provision of information services to the information centre, and then it disperses financial responsibility for the purchase of materials to all the departments. Because the second largest expenditure (after staff) of an information centre is for resources, not having control of these funds greatly weakens the ability of the centre to achieve policy objectives. It is not uncommon to find an institution in which the total of library type resources purchased outside the information centre is greater than the material funds of the centre itself.

In order to prove to the institution's executive that this method of dispersing funds for the collections or information resources is inefficient and counter-productive, it would be useful to use cost-benefit analysis techniques. Cost models can be developed for the two organizational structures, with models of cost estimates or cost-effectiveness illustrating the relationship between the alternatives.

ORGANIZATION AND MANAGEMENT OF SPECIAL LIBRARIES

Olga Lendvay

This lecture was based on the second edition of the manual "Primer for Agricultural Libraries" by O. Lendvay, which was distributed to all participants of the course. The purpose of the lecture was to familiarize the students with the contents of the manual by commenting briefly on relevant topics. Although the "Introduction" and the various lists in the appendices of the manual stress agricultural subjects in relation to library practices, there is only an occasional reference to them in the main body of the manual.

Page references within this lecture refer to examples in the manual.

DEVELOPMENT, PROCESSING AND ORGANIZATION OF A COLLECTION

Users and their needs should be identified before starting to collect publications for an agricultural library. Then selection and acquisition should be guided by a policy. All types of materials should be considered: reference and text books, specialized books or treatises, bibliographic publications, periodical and serial publications, pamphlets, reprints, microforms, films and filmstrips, and slides.

Selection

Policy on selection and acquisition should be developed by considering the following:

- Objectives of the library,
- Needs of the users,

- Usefulness of specific tools,
- Proximity of other libraries, and
- Budget restrictions.

Aids to Selection

Various items will be of use in the selection process:

- Publishers' and booksellers' catalogs and lists of titles currently available,
- Lists of publications of government departments, research organizations, universities, learned and scientific societies (in separate publications, or their annual or progress reports),
- Bibliographies and lists of references prepared by larger libraries,
- Notices on new titles and book reviews in scientific journals,
- Proceedings of conferences, and
- Visits to bookshops.

Acquisitions

There are three possible ways of acquiring publications: purchase, gifts, and exchange.

Purchase

There are three types of publications that may be purchased:

- Commercial publications, including most periodicals and books;
- Periodicals, by subscriptions on a 1-year basis, either through an agent or directly from the publisher; and

- Books, acquired either directly from the publisher or through an agent.

The library should register all identifying data of publications acquired, plus cost and date. Multiple slips of different colours are used in large libraries for ordering books, whereas small libraries usually request them by letter or simple forms. When invoices are received, they should be checked against the orders before payment.

Gifts

Many institutions produce small publications and distribute them free. Authors distribute free reprints of their articles. Individuals may donate private collections, which may be a problem if the subjects of the donated books are not of interest to the library. It is therefore advisable to make an agreement with the donor that books of no interest will be sold, exchanged or donated to another library.

Exchanges

Some publications are available only on exchange. Exchanges are usually reciprocal, but some institutions do not insist on item-by-item exchange. Exchange may be initiated by letter (examples p. 56-57). Records should be kept up to date.

List of new acquisitions

It is important to keep users informed about new acquisitions. A list should be made regularly; catalog cards may be used to produce the list.

Preparation of Materials for Users

Cataloging

The following should be used in cataloging:

- Cataloging rules (e.g., Anglo-American Cataloguing Rules).

- Rules for author number (Cutter).

- List of subject headings, if LC and Sears are too general, a small agricultural library may find it necessary to develop its own list based on the subjects of its collection.

- Cards (7.5 x 12.5 cm).

Cataloging can be made simple by using subject entries and such cross references as "see" and "see also". When assigning subject headings, the user should be kept in mind.

Catalog cards can be reproduced by simple duplicating equipment (Chiang or Multigraph) for secondary cards.

Classification

Several systems should be studied:

- Dewey Decimal (pure) divides all human knowledge into 10 classes.

- LC divides human knowledge into 21 groups by using 21 letters of the alphabet together with numbers (mixed classification). For example, "SB271" represents the subject of tea growing, with agriculture being represented by "S", plant culture and horticulture by "SB", and tea by the number 271.

- UDC is more developed and is suitable for large libraries.

Classification symbols on the spines of books serve for arranging books on the shelves.

Author number

Cutter tables are used to assign author numbers. The author number completes the call number and distinguishes books within the same classification number.

The catalog

A cabinet with drawers containing 7.5 x 12.5 cm cards is required. The drawers should be labeled and guide-cards inserted to break down the card sequence into manageable groups.

There are various types of catalogs:

- Author catalogs (personal, anonymous, corporate, some titles);
- Subject catalogs (important in special libraries);
- Dictionaries (combines author, subject and title);
- Reference cards ("see" refer from a nonused subject heading to a used one and "see also" to additional subjects);
- Computer print-out catalogs; and
- COM/fiche catalogs.

Journals

Control of journals is maintained with a card system (Kardex) with different cards for different frequency journals.

Journals may be arranged in stacks according to the classification system used in the library or, preferably, by alphabetical order of titles. The newest issues should be exhibited.

Pamphlets, bulletins, and circulars

When this material arrives at the library, it has to be assessed according to its value to the collection. Because they are so numerous and do not fall in normal bibliographic patterns, there are difficulties in the organization of pamphlets, bulletins and circulars. Important pamphlets should be reinforced and put on shelves with books. Other pamphlets should be put in boxes labeled by subjects, countries or institutions, and arranged in alphabetical order.

Maps

Maps are important in agricultural libraries (soils, climate, etc.)

Analytical cataloging is needed for important maps in books.

Special cabinets are required for storing maps.

Films and filmstrips

Special cabinets are required for storing films and filmstrips. All items should be cataloged by title, and their width, colour, sound and duration should be indicated.

Slides

Slides should be stored in small boxes, and each unit numbered.

Microforms

Special equipment is required for the reading of microforms and special metallic cabinets for their storage. Microforms should be cataloged as books, with a note or symbol on each card indicating whether it is a microfiche or microfilm.

SERVICES TO USERS

It is very useful to have a pamphlet describing the library's services. These services fall into several catagories.

Circulation and Loan

The principal function of the circulation and loan service is to make available to the user the books, pamphlets, periodical and serial publications, and all other materials held in the library.

The responsibility of the circulation staff is to loan - and to receive in return - library materials; to issue claim slips for overdue returns; to collect fees (if the library decides to collect them); to supervise stack areas; and to place returned books on the shelves promptly.

In libraries where stacks are closed to users, a member of the circulation staff looks for a publication in the stack room and then hands it to the user. In libraries where stacks are open, the user looks for the publications needed.

Loans outside of the library are arranged through interlibrary loans. This means that the material is loaned only to another library (not to an individual) and the borrowing library is responsible for its return in good condition.

Union lists and catalogs are used to identify the location of publications in a library system for the purpose of interlibrary lending and exchange.

Reference and Information

Any organized collection requires someone to interpret the information it contains. For this purpose, a professional librarian, with some additional subject training, would be most suitable.

A reference librarian will answer specific questions, assist in bibliographic research and prepare bibliographies. This work will require thorough knowledge of the tools, e.g., indexes, abstracts, etc.

Compilation of Bibliographies

The reference librarian is not always responsible for the service of bibliographic compilation. In the more important libraries, this is undertaken by a separate section that is responsible for the compilation of extensive bibliographies on specific crops or subjects, and also short bibliographies to satisfy users' requests. These bibliographies can be compiled from the publications received in the library, or from secondary publications such as indexes, bibliographies, and abstract journals, or from a combination of both.

The bibliographic compilation service is free in some libraries; in others, a fee must be paid.

Reproduction Services

The copying of pages from library documents may be a free service offered to libraries or a special group of borrowers instead of loans; all others would pay a service fee.

A wide variety of photocopying equipment is now on the market. If the rental or purchase of equipment is being considered, several factors should be investigated. They are the initial cost, any available local servicing, and the ability to meet any special needs.

In relation with providing copying services arises the question of copyright protection. Making single copies for research purposes usually is not considered to be a violation of copyright.

A library may also wish to operate a program of photocopying for preservation. Special libraries often have materials in their collections that are difficult to locate elsewhere. If these materials begin to deteriorate physically, it may be best to consider some type of photoreproduction to preserve them. Microfilm or microfiche are most often used for preservation. Copies of the original films may be sold to any libraries wishing to enlarge their collections.

A large variety of materials in microforms can also be purchased from publishers.

Current Awareness Services

List of new acquisitions

Agricultural and other special libraries usually publish frequent lists of new acquisitions to notify all those whom they are designed to serve of all new arrivals. The serial publications will form the bulk of the contents of these lists.

Table of contents

Some libraries provide a "Table of Contents" service to selected users. The tables of contents of important journals are reproduced and circulated to groups of users or to individual users. For some subjects, commercial services are also available.

Personal contacts

A library may have an arrangement with individual local users by which they are notified, personally or by telephone, of new arrivals in which they may be specifically interested.

SDI - Selective Dissemination of Information

With the introduction of computers into libraries, SDI has been offered to individual users or to groups of users. Based on a user's profile of specific subject interest, data bases are searched for references to documents on desired subjects. The results of searches are distributed to users in the form of printouts.

Some libraries, which do not have access to computers, provide manually produced SDI for a limited number of users.

Question and Answer Service

Questions on many limited subjects, which require specific data, come to agricultural libraries from research workers who are not within easy reach of the library, as well as from scientists working in the same institution as the library.

An agricultural specialist on the library staff is usually in charge of this service, and is, in turn, in contact with local scientists who can help answer those questions that are beyond him. The answer will identify the published sources which deal with the subjects, or will provide a short description of the subject, with or without some indication of additional sources where more precise information can be obtained. The service is usually conducted by correspondence or, in urgent cases, by telephone, telex, or cable.

INSTRUCTION ON THE USE OF THE LIBRARY

Users should know what resources the library offers. Instruction may be offered in one of three ways:

- Formal course, including theoretical and practical instruction regarding data on catalog, reference books, indexes, abstracts, bibliographies, etc.;
- Manuals and guides (which should be free for users) on library organization, collection classification, etc.; and
- Brief verbal explanation to groups of users.

MAINTENANCE OF COLLECTION

The preservation of a collection is a continuous process, including binding journals, and rebinding and mending books. Maintenance may be handled by commercial binding services or by an in-house operation. It is important to keep records of items in binding and to also indicate this in the catalog.

The inventory establishes where books are. (Shelf-list cards are used.) The cards of lost books are removed from the catalog and cards are made for books on the shelves that don't have cards.

Statistics are used to produce reports, to evaluate performance and services, and also to serve publicity purposes.

PUBLIC RELATIONS

The purpose of public relations in libraries is to ensure an enthusiastic coordination between the staff of the library and the users.

The essence of a public relations program is a thorough organization of the staff. The attitude of librarians toward users is reflected in the public assessment of the degree to which the purposes of the library are accomplished. The program should not promise anything that it cannot offer. The librarian should dedicate much of his or her time to the study of users. He or she should be familiar with the educational and research programs and should be consulting the persons in charge of projects and the committees on the selection of publications.

Through the procedures related to the loan of publications, the public becomes aware of the activities of the library and perceives its attitude and cooperative spirit. For many people, the circulation section is the only section with which they come into contact.

ADMINISTRATION AND MANAGEMENT

In essence, administration is the management of people and activities to accomplish objectives. It is responsible for establishing effective working relations between people and resources to employ all available energies in a dynamic process. Administration analyzes situations to produce agreements among people and to reach decisions between various alternatives, and then to put them into effect. The specific functions of administration include planning, organization, management, staff, coordination, and finance.

Planning

The purpose of planning is to decide the course to be followed. It involves determining:

- Objectives,
- Clear conception of intentions and strategy,
- People to do the work,
- Organization,
- Supervision and coordination, and
- Finance and budget.

Planning is a difficult task, especially when it is long term. It is difficult to forsee at any given moment what interferences may occur within a particular period. Therefore, planning is easier and more accurate when the projected time for attaining the final objectives of a plan is divided into stages and distinctive objectives are determined for every stage.

Organization

Organization, or library structure, is the establishment of an authoritative structure that should be carefully defined and coordinated to achieve final objectives.

There are several useful tools that help in the organization of a library. The most common is the graphic representation of the organizational structure - an organogram. It should clearly demonstrate:

- Major responsibilities of every officer,
- The lines and levels of authority, and
- The relationship between every officer and his/her superior, subordinates, and associates.

The organogram should represent both functions and assigned tasks.

Management

Libraries may operate under a Committee, or may be in the sole charge of a librarian. Such a Committee is formed of persons who operate as a group to perform certain functions: the Committee is responsible for formulating policy and for its administration; and also for the acquisition of adequate funds for the library. The Committee has no executive function; this is the proper domain of the Chief Librarian.

If the Chief Librarian possesses the necessary education and qualifications for managing the library, he should be in complete charge of it. In that case, he would have a proper place in the administrative hierarchy of the institution of which the library is a part, and he would thus be a member of the body responsible for the formulation of policies.

Staff

The number of persons required for a library depends on its size, and on the program and activities to be developed according to budget.

There are three categories of staff: professional, semiprofessional, and support.

The Chief Librarian assumes major responsibilities concerning the staff. There should be clear, written policies on the positions, work, supervision, obligations, and rights. There should be a detailed description of work required of every position; of procedures for selection and employment; and for orientation of a new member.

Coordination

Coordination is an important part of the Chief Librarian's duties. It is his responsibility to help the members of his staff to understand how their own work fits into the organization as a whole, and how their functions affect operations in other sections and in the whole organization.

Finances

The financial needs of a library will depend on the services to be offered, on the methods of education, on any research activities, on the production of publications, and any outstanding accounts. Hence, to devise an adequate financial budget, it is essential, first, to define clearly the objectives of the institution, and to define the role of the library in any educational program; and, second, to decide how specific functions may be accomplished.

Budgets can be based on service units or can be a projection of expenditures from previous years. A budget should include:

- Salaries for professional, semiprofessional, and support staff;
- Equipment;

- Supplies; and
- Books and journals.

Sources of financing include:

- Institutional funds,
- Donations and grants, and
- Fees for services.

The accounting should be able to indicate at any moment the amount of money available to the library for expenditure, the amounts disbursed or committed, and those not yet appropriated. This activity is usually undertaken by an administrative department of the institution of which the library is also part.

NEW LIBRARY BUILDING

If a new building is being planned, the following should be taken into account:

- The librarian should be involved with the architect in the planning;
- The building should be centrally located, near other buildings;
- It should be functional, pleasant, quiet and well lighted;
- Reading areas should be away from the noise of traffic and of typewriters; and
- Some storage space should be available.

AUTOMATION

Libraries can now use automatic and semiautomatic data-processing machines to perform traditional activities, such as the control of acquisitions, cataloging, serials and circulation.

When deciding about the use of automation systems, it is advisable to consider:

- The economics of the system and benefits to users,
- Changes in the occupation of the staff, and
- Management requirements.

Automation implies the conversion of existing records into machine-readable form. It requires adherence to certain standards and to the basic structure of the system.

Output from the computer record can be in the form of "hard-copy" (which is more costly) and "soft-copy" (which is displayed on a terminal).

AGRICULTURAL DATA BASES

Agricultural data bases include:

- FAO AGRIS system = AGRINDEX,
- NAL = AGRICOLA Bibliography of Agriculture, and
- CAB = Abstract journals.

TOOLS AND SERVICES OF INFORMATION CENTRES, WITH SPECIFIC EXAMPLES FROM CISTI

M. Beckman

As described in my presentation about a special information centre in a Canadian company, Polysar, there are many services provided by a library/information centre. Essential to all of these, of course, is the collection or information resource of the centre: information must be acquired and cataloged or organized, and then access to it must be provided. In Canada at the present time, most libraries are using automated systems to catalog their books, journals, government documents and reports; they provide access to them through card or COM/fiche catalogs or on-line access through public enquiry terminals.

SERVICES

There are a number of traditional services offered.

Circulation

Most information centres circulate books to their users, usually for a 2-week loan period, with one renewal allowed. Although almost all university libraries and many public libraries have automated circulation systems, very few special or government information centres do because the circulation of monographs is not their primary service.

Journal Routing

Journal routing, however, is a service which is almost unique to the special/government library. It is accomplished in one of two ways. In one case, there is a routing slip made up for each journal to which the library subscribes; when the latest issue arrives, the slip (containing names of all users who have expressed a desire to see the journal) is attached to it, with space provided for the dates it was received and then rerouted to the next user. The problem with this method is that one journal issue may take months to travel around an organization, so that the information is useless by the time it gets to the final name on the routing slip.

The second and more effective method for routing journals was described earlier this week. A photocopy is taken of the table of contents and abstracts of each article in a journal issue, and is then sent with an appropriate request form to every potential user in the organization. If an article is desired, the user checks the form and returns it to the library, where the article is photocopied and returned to him. The journal is therefore always available in the library, and all users receive required information in a timely fashion.

Current Awareness

Current awareness is also a service most commonly offered in special libraries. Reference librarians discuss fields of interest with a patron and develop what is called a profile. Using this as a guideline, they then are able to direct specific books, journal articles or other items of interest to the attention of the user. This service is greatly enhanced with automation, as will be discussed below.

Reference

Reference is of course a traditional North American library service, encompassing all those activities such as literature searches, identification of specific information, instruction in the use of a bibliographic tool, or assistance in finding and using information.

Information

Information services are combined with reference in smaller libraries, but in large public or academic libraries, they are a separate function. Supported by small collections referred to as "quick reference" (dictionaries, directories, almanacs), staff members provide information such as names, addresses, phone numbers, dates and schedules, either in person or by telephone.

On-Line Retrieval

On-line retrieval is a service that has only been available for the past few years. There are several data-base vendors in North America, all of which mount data bases of scientific and technical bibliographic information. Because each has its own protocol or system for accessing the data, librarians have to be trained as searchers for several systems. In Canada, the most commonly used are three American systems and a Canadian one: Lockheed-Dialog, Infomart-Orbit, BRS (Retrieval Services), and CAN/OLE.

Analysis

Analysis is another service that is offered in special libraries but not in academic or public libraries. Specialized library staff with competence in scientific and technical disciplines analyze reports, books, articles and documents and synthesize the information contained in them. This information is then either published or routed to interested patrons through the current awareness program.

Translation

Translation is also a highly specialized service that is offered only in special libraries. However, translations of scientific and technical literature are frequently published and made available to the broader scientific and technical community.

Resource Sharing

Resource sharing through interlibrary lending (ILL) is a service offered to some degree by all libraries in North America, although less so by school libraries. Protocols exist throughout North America to ensure the use of basic forms and certain procedures for lending material. Advances have been made in this service in the past decade: most libraries use telecommunications (Telex) to send requests to other libraries, and there are many regional consortia or networks that share a delivery service to move books and photocopies from one library to another. On-line ILL has also improved the service, allowing a library to identify a needed item in another library by accessing that library's catalog on-line and using an ILL module in the on-line system to request the item. None of these advances has really solved the problem of moving the wanted item thousands of miles - mail delivery is still very slow. Telefacsimile and optical discs are being studied as one solution to the problem of delays that are considered unacceptable in the delivery schedule of an ILL item.

Resource sharing through ILL does offer a large country with a small population, like Canada, the opportunity to bring greater resources of information to the whole community than would otherwise be possible.

CISTI

CISTI, of course, is a very special library and information centre; but a detailed explanation of its many services may serve as an illustration of what can be made available.

Resources

The CISTI collection includes:

- Over 30,000 journal titles in science, technology and medicine;
- A comprehensive collection of conference proceedings;
- Over one million documents on microfiche, comprising the report literature of such organizations as the U.S. Government, International Atomic Energy Agency, U.S. Bureau of Mines, American Institute of Aeronautics and Astronautics, Microlog (Micromedia Ltd); and
- One of the world's most extensive collections of international abstracting and indexing services.

These resources are made available through all of the other CISTI services.

Union List of Scientific Serials in Canadian Libraries

To make information about its resources available, in 1957 CISTI developed a bibliographic tool that has been of immense service to the country - the Union List of Scientific Serials in Canadian Libraries (ULSS). The ULSS contains the holdings (in science, technology and medicine) of more than 250 university, federal, provincial and industrial libraries. This means that Canadian scientific and technical communities have ready access to the contents of some 46,000 different serial publications and journals - or at least 80% of the world's scientific and technical literature. Originally produced in a labour-intensive fashion, the ULSS was mechanized in 1967, and by 1974 it was available in book, microfiche or on-line (via terminal) format.

Bibliographic Tools

Other major bibliographic tools were also developed. For instance, in 1966 CISTI was assigned responsibility for serving as the Health Sciences Resource Centre for Canada. A government committee recommended not the establishment of a national medical library, but rather that CISTI take action to coordinate, strengthen, and make readily available existing medical literature and information resources throughout the country. Over the years, a variety of reference tools have been published to assist in this coordination, such as Canadian Locations of Journals Indexed in Index Medicus, and Conference Proceedings in the Health Sciences, a listing or index to such proceedings held by CISTI from 1925 to date. The Centre, working in collaboration with the U.S. National Library of Medicine, provides the Canadian medical community (through 10 MEDLINE centres) with direct access to the contents of 2400 of the world's leading medical journals.

Similar tools have been developed for other disciplines or purposes, such as the Directory of Federally Supported Research in Universities.

CAN/SDI

CAN/SDI is a batch or off-line computerized system that informs Canadian researchers, technologists and managers in industry, universities and government of the most recent publications (journal articles, conference papers, technical reports and patents) in their fields of interest, by using an "interest profile" based on information needs. This profile consists of keywords, phrases, and author and organization names that describe personal or group requirements. Either once a week, every 2 weeks or once a month (depending on the data base selected), a list of references retrieved from CISTI's data bases is mailed to the user. CAN/SDI is accessed through CISTI or one of three other centres, depending on the field of interest: Agriculture Canada, Geological Survey of Canada, or Canada Centre for Mineral and Energy Technology.

CISTI has held seminars across Canada to train librarians in profile design. A subscription form for the service is either sent directly to the CAN/SDI Centre or through a library; after the profile of the requestor is tested, the service is begun. Cost is based on the particular data bases searched and the number of references received.

CAN/OLE

CAN/OLE is a Canadian-designed and -operated national on-line information retrieval system for the retrospective searching of bibliographical reference files in all major fields of science and technology. It includes millions of references from the world's major abstracting and indexing services available for on-line searching. The service is used by research and development organizations, universities and governments. It efficiently searches the world's scientific and technical literature for needed information; reviews state-of-the-art research before a new project is begun; eliminates costly duplication in research and development; and optimizes use of the researcher's time.

Through CAN/OLE, access is provided to the combined holdings of over 250 Canadian libraries, in either English or French. CAN/OLE can be accessed from over 50 cities in Canada through the DATAPAC communications network of the Trans-Canada Telephone System at no extra cost.

Users can access CAN/OLE directly if they have a terminal, a user identification, and an appropriate communications network connection. Each user receives a 2-day training course and a manual for quick reference to instructions. A CAN/OLE bulletin provides information about new data bases, system improvements, network developments and other news.

The average cost of a search is $30-$35.

CAN/DOC

This service is an expansion of CAN/OLE and it allows the user to order (on-line) copies of a document cited in the on-line CAN/OLE search, with normal photocopying charges applying. This greatly speeds the information transfer process.

Unified Literature Search Service (ULSS)

The Reference and Research Department of CISTI handles reference requests in a combination of conventional manual ways (using reference tools, abstracts and indexes) and computerized search systems (retrospective and constantly updated machine-readable files of bibliographic citations). This service is the one most used by industry without the service of their own library/information centre. In addition to CAN/OLE, the ULSS service uses DIALOG, ORBIT and QL Systems.

There is a minimum fee of $30 for this service.

Interlibrary Loans and Photocopy Service

The Document Delivery and Search Service of CISTI responds to the needs of libraries and information centres in government, universities, industry and private concerns, as well as to those of individuals across Canada by supplying loans or photocopies of materials from its collection. If a requested item is not in the CISTI Library, it is located elsewhere and loaned to or copied for the requestor. Otherwise, the requesting library is notified of the location so that it can make a request to the identified location immediately.

Requests are accepted on standard forms, by Telex or on-line as part of the CAN/DOC module on the CAN/OLE System. Most requests for material held by CISTI are filled within 36 hours.

Scientific Numeric Data Bases - CAN/SND

A user connects to the NRC computer via DATAPAC and conducts data-base activities in a conversational mode. Service is available 24 hours/day from machine-readable collections of critically evaluated scientific numeric data. Computer programs allowing the user to search, retrieve and manipulate the data have been developed so that a user may make the following applications:

- Search for studies relating to elements, compounds and chemical classes;
- Search for studies dealing with molecular fragments;
- Search for infrared spectra of known compounds;
- Retrieve numeric data for inspection or subsequent calculations; and
- Plot molecular diagnoses.

The user may also lease a magnetic tape copy of the desired parts of the data base for private use on a local computer. If neither computer nor DATAPAC connections are available, the user may submit a search problem to CISTI. CISTI staff will execute the search and the data manipulation and then return the appropriate computer listings.

The fee for this service is $30 minimum, with no labour charge. It is based on connect time and computer resources used; it also includes costs of tape and postage, or on-line costs.

Health Services Resource Centre

The Health Services Resource Centre (HSRC) is a unit within CISTI which provides information services and support to the Canadian health science community.

HSRC will:

- Answer health-related reference questions;
- Refer to organizations or experts in the field who can be of assistance;
- Perform computerized literature searches using MEDLINE, TOXLINE, Excerpta Medica and a host of other bibliographic data bases; and
- Assist in accessing CISTI's extensive collection of journals and monographic literature in the health sciences.

There is a charge for computerized literature searching; other information services are free.

HSRC is Canada's national coordinator for the United States National Library of Medicine's MEDLINE system. MEDLINE is a computer-based information retrieval system containing bibliographic references to much of the world's published literature in medicine and toxicology, as well as unpublished information on oncology. Because nearly 100 centres have been established across Canada, computerized literature searching is available to health practitioners and researchers from coast to coast. Centres have been established in academic libraries, hospitals, pharmaceutical firms and research centres.

HSRC links with this network by:

- Searching the data bases,
- Referring to a MEDLINE centre that gives service in a specific area, and
- Arranging for an organization to become a Canadian MEDLINE centre.

As a national resource centre, HSRC actively supports information activities across Canada through continuous contact with the health science community. HSRC ensures that health science literature is available to Canadians, and it maintains a publication program to promote cooperative collection building in Canadian health science libraries.

HSRC currently publishes:

- Health Sciences Information in Canada: Libraries, a directory of more than 450 Canadian health science libraries;
- Health Science Serials on Order, a bimonthly publication listing biomedical serials on order in major Canadian health science libraries; and
- Canadian Locations of Journals Indexed for Medline, an annual list of locations throughout Canada for more than 3000 health science journals.

Knowledge Source Index

The Knowledge Source Index (KSI) is an inventory of Canadian experts in the fields of science and technology. It is used at CISTI as a means of locating appropriate experts in response to enquiries from the Canadian public. Collection of data began in 1974, and the KSI is now in an evaluative stage. At present, the data base contains profiles from 14 federal government departments, most of which are completely covered by the KSI. Five Ontario ministries are represented, as are three Ontario-based organizations and 12 Canadian universities. Further expansion is planned, as time and resources permit. During the present experimental stage, there is no charge for accessing this index.

The KSI consists of an alphabetical subject index, a listing of individual profiles, and an identification file. In order to maintain confidentiality, these master files are available only to CISTI staff.

Publications

CISTI makes its services known through numerous publications, many of which have been discussed above. Newsletters, brochures, manuals, directories, bibliographies, indexes and guides are among the types of publications available, free or for purchase.

Data Bases

Data bases available through CISTI's search systems (CAN/SDI, CAN/OLE, ULSS) are as follows:

- BIOSIS Previews (BA and BA79)
- CA Condensates (CAC)
- CA Search (CAS)
- Chemical Index (CHEMX)
- Compendex (EI)
- Physics Abstracts, Electrical and Electronics Abstracts, and Computer and Control Abstracts (INSP)
- Government Reports Announcements and Index (NTIS)

Canadian data bases include:

- Alberta Oil Sands Index (AOSI)
- Cooperative Document Project, Guelph (CODOC)
- Environment Libraries Automated System (ELIAS)
- Directory of Federally Supported Research in Universities (IEC)
- Northern Research and Documentation Service (NRIS)
- CISTI Catalogue (OON)
- CAN/MARC (OONL)
- Canadian Transportation Documentation System (OOT)
- Union List of Scientific Serials in Canadian Libraries (UNION)

Other Services

In addition to the services described, CISTI staff provide training seminars for staff members in other libraries who wish to learn on-line retrieval. Researchers who want to be able to search independently are also offered training programs.

CISTI staff are also heavily involved in the development of the Canadian STI network: they offer technical assistance, chair committees, and design and test network components. This description of all its services clearly shows that CISTI is the vital force behind the flow of scientific and technical information to industry, government and the academic community in Canada.

NETWORKING AND COOPERATION

INTERNATIONAL COOPERATION IN INFORMATION: THE AGRICULTURAL SECTOR AS AN EXAMPLE

K.P. Broadbent

Since the beginning of this century, the growth in scientific literature has been exponential. Each year, thousands of documents are published on every subject, with the result that the average scientist finds it impossible to keep up to date.

The starting point of a review of international cooperative information systems in agriculture is 1975 - which is not long ago for most of us engaged in scientific information work. In that year, Philippe Aries made the development of global information services the theme of his address to the 4th World Congress of Agricultural Librarians and Documentalists in Mexico City (Aries 1975). It was also in 1975 that the International Information System for Agricultural Sciences and Technology (AGRIS) began operating and published the first edition of the current bibliography on agriculture, Agrindex. Agricultural information involves many types of services. It not only covers many topics, but also touches on a broad range of disciplines, catering to a very wide range of users: veterinarians, dairy scientists, soil scientists, agricultural economists, plant pathologists, as well as farmers. AGRIS is, therefore, what we call "mission-oriented" and was established by the agreement of participants according to a set of rules.

PROBLEMS

Before 1975, there was a proliferation of services. Frauendorfer's survey of agricultural information services in 1969 (Frauendorfer 1969) first pointed out the vast number of information services in the field, all acting in an uncoordinated manner. In 1973, Boyle and

Buntrock (1973) also pointed out gaps in services and, for the first time, made us aware of the differences in scope, types of user, funding and organizational structure, products, depth of coverage, and language.

The main problem facing users is how to obtain information. Documents must not only be listed, they must be made available. Many barriers exist: for example, in some developing countries, foreign currency is not available to pay for documents published in another country; or an important document may be available only in Spanish (and of course translation is costly). The most common barrier, however, is sheer inaccessibility. A document cited in an index is available only in limited quantities, insufficient to satisfy a large clientele abroad. How frustrating to be told about an important document, yet not be able to get a copy of it! Finally, lack of comprehension may be an obstacle. The user may know that relevant literature exists but may lack sufficient knowledge to fully comprehend its contents. An intermediary may be required to analyze and interpret it.

The basic problems involve the means of retrieving literature, the ability to obtain it, and especially the transfer of information from the researcher to the planner, the extension worker, or to the very basic level of the farmer.

These problems are not insurmountable, but they can, and regularly do, hinder the flow of information. This is particularly true in developing countries, where lack of education, limited access to foreign currencies, and an inadequate national infrastructure tend to inhibit the transfer of information.

THE AGRIS CONCEPT

AGRIS was conceived out of the need to provide a basic service to international users of agricultural information that would alleviate some of the constraints described above. Moreover, users were demanding a single data service for agricultural literature. The idea for AGRIS took shape in 1969 when it was realized that the two main agricultural data sources - the U.S. National Agricultural Library (NAL), with its magnetic tape service and monthly Bibliography of Agriculture, and the Commonwealth Agricultural Bureaux (CAB) (Boyle and Buntrock 1973) - not only had a wasteful degree of overlap, but more importantly were missing a lot of pertinent information. Both institutions also realized that they could never individually have the resources to cover world literature entirely. The heads of these two services at that time, John Sherrod and Sir Thomas Scrivenor respectively, approached FAO because the collection, analysis and dissemination of information related to agriculture is one of FAO's basic tasks. As a result, AGRIS emerged in 1975.

The then Director General of FAO nominated a Panel of Experts to advise him; it met at first under the chairmanship of Sir Thomas Scrivenor and later under John Woolston, Director of Information Sciences Division of the International Development Research Centre.

The system was designed primarily as a decentralized operation, with each country undertaking the responsibility for contributing its own agricultural literature. The pattern on which it was modeled was that of the International Nuclear Information System (INIS). The territorial formula adopted by AGRIS virtually eliminates the possibility of duplication. Usually, information is reported and made available more promptly in its country of publication than elsewhere.

Little-known literature that has been published in limited editions has a better chance of getting into the international system than ever before. The principle of cooperation is the cornerstone. Costs are kept to a minimum: the "fee" is the national effort to report pertinent literature and the return is the combined output from the international system.

Systems of the INIS-AGRIS type, transcending national boundaries, are subject to several pressures. The strongest pressure is political: it was directly responsible for the establishment of INIS, but in agriculture, decision-making is weak because of diverse interests. John Woolston (1976) has described this problem and its effect on services when faced with new partners. The information needs of poorer countries are most important, especially if for the general betterment of humanity through the effective transfer of ideas is considered preeminent. Woolston puts it thus:

> From each according to his wealth, to each according to his needs - this is the INIS-AGRIS formula, where wealth is measured by a country's production of information and needs are measured by its requirements for information. The Rich countries not seeking to retain a monopoly of knowledge and then exploit it to widen still further the gap between themselves and the Poor. But will the Poor believe that? Only if the Rich demonstrate a willingness to put their knowledge in the pool.

The present situation is this: the largest volume of input provided to AGRIS is by the European communities; Japan provides almost comprehensive coverage of its literature; the U.S. is following suit. Gradually, more and more countries are finding it useful to cooperate with AGRIS. Over 90 countries from Africa, Asia and Latin America are currently participating in an effort to match the richer countries' contribution.

Each country records its own literature. This may be done simply by filling out a worksheet according to the established guidelines, or by typing the necessary bibliographic details of the document on sheets of paper with a specially adapted typeface that can then be read by the computer. (This is called Optical Character Recognition, or OCR). The cooperating institutions that have access to computer facilities can send their contribution directly by magnetic tape. All these materials are merged by FAO into one unified data base. Originally, AGRIS lacked a controlled vocabulary, so that the Agrindex was limited to the enrichment of titles and the use of commodity codes.

In 1976, UNESCO was formally invited by FAO to arrange for an independent evaluation of AGRIS (Badran et al. 1977). UNESCO's responsibilities were to establish terms of reference for the appraisal and to ensure that UNISIST guidelines concerning international transfer of information were adhered to. The team endorsed the AGRIS concept and recommended as a top priority that FAO and other interested organizations should commit resources for the ongoing operation and development of the system. The team also recommended that increasing attention be devoted to the provision of outputs and services in using the AGRIS data base; that communication among various AGRIS centres and the AGRIS Coordinating Centre in FAO be improved; and that a more aggressive approach be used in the promotion of the data base on magnetic tape and in the printed form of Agrindex. Other recommendations included refining the approach to indexing and retrieval, incorporating multilingual access devices, and developing a subsystem for the supply of documents. At present, most (if not all) of these recommendations have been fulfilled.

SPECIALIZED INFORMATION NEEDS

AGRIS is a current awareness service for agriculture. There are other services that provide more detailed coverage - abstracting and selecting material, rejecting what is considered unimportant or of poor quality. A good example of this type of service is provided by the Commonwealth Agricultural Bureaux (CAB) and Tropical Abstracts; GERDAT provides similar services in French. AGRIS, however, plays quite a different role from services like CAB's in that it aims at providing rapid, comprehensive coverage of all literature. Despite advice on documents that should not be collected, a decentralized system such as AGRIS will inevitably input the bad along with the good; but in doing so, it provides access to much valuable information that the selective services miss altogether.

It is important here to note the primary distinction between AGRIS and in-depth, selective services like CAB's. This distinction has been simply described in terms of two levels: level one aims to provide the fullest coverage through the rapid reporting of literature by titles only, whereas level two provides the selection many users require through abstracting and the provision of in-depth indexing.

The abstracting services themselves are limited by the amount of literature that can realistically be covered without slipping into the level one category. The specific needs of scientists need to be catered to: in response to the need for literature on specific crops or commodities, information centres dealing with limited areas of interest have become necessary.

International cooperation in crop research, which began in the early 1960s, led to the establishment of centres of excellence, such as the International Rice Research Institute (IRRI) and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT). At such centres, the collection of a highly specialized body of literature became possible. The Cassava Information Centre, located at the Centro Internacional de Agricultura Tropical (CIAT) in Colombia, is a good example. An attempt has been made to gather together as complete a collection as possible of the documentation on cassava (or manioc), a tropical crop that had up to that time received scant attention from researchers. At the Cassava Information Centre, retrospective material has been gathered, abstracted and published; current literature is made available as a card service. Access to the world's collection of cassava literature is now available to international users by an optical-coincidence indexing system based on a thesaurus compiled for this purpose. Additional services include the publication of a newsletter, directories and a series of manuals for researchers and extension workers.

CIAT is one of the research centres set up under the auspices of the Consultative Group for International Agricultural Research (CGIAR), sponsored by the World Bank and FAO. Its role is to foster cooperation in agricultural research in order to transfer research results directly to poorer countries and ultimately help alleviate the food supply problem. Many of the CGIAR-supported institutes have good library facilities and have thus been able to set up specialized information centres, some of which have also been supported by IDRC.

Ideally, information should be shared among nations. Only then can poorer countries benefit from the endeavours of their colleagues in richer countries. One way to do so would be for AGRIS to feed general information to specialized services, which would then treat significant documents more fully.

There are many problems to be overcome before true international cooperation will work in this way. The most important constraints are financial and political, as well as technical. However, the INIS-AGRIS model has paved the way and proved its value.

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HOW TO MANAGE AND LINK ALL COMPONENTS TOGETHER

J.B. Wills

INTRODUCTION

Earlier this morning, we looked at CISTI as an example of the organization of a major information centre. We have identified components, tools, and services. Later today, you will be discussing the information networks that assist each information centre in doing its work - networks that information centres either participate in already or will do in the future.

For this session, we will be concerned with the way in which an information centre manager can improve the services provided, taking into account the existing structure of the centre.

The increasing use of computers is inevitably forcing managers to view the provision of all their services as one integrated operation. There is of

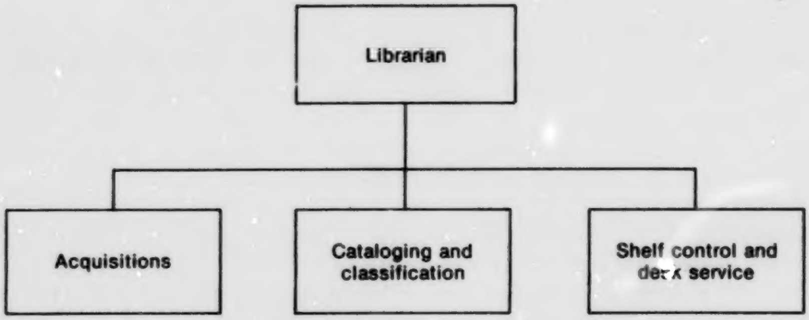
Librarian
Acquisitions
Cataloging and classification
Shelf control and desk service

Fig. 1. A custodial library.

course much diversity in information centre structures all over the world: individual structures depend on the needs of users and sometimes on the previous experience of the manager. Basically, however, there are two broad groups of centres:

- Those that are essentially custodial libraries, with only a few user services that have been added as the need has arisen, and
- Those that are user-oriented, where the library is one of many resources on which the centre depends.

TYPICAL DEVELOPMENT OF INFORMATION CENTRE COMPONENTS

The development of a custodial library (Fig. 1) involves:

- Acquiring monographs and periodicals (purchase/gift/exchange);
- Cataloging and classifying accessions;

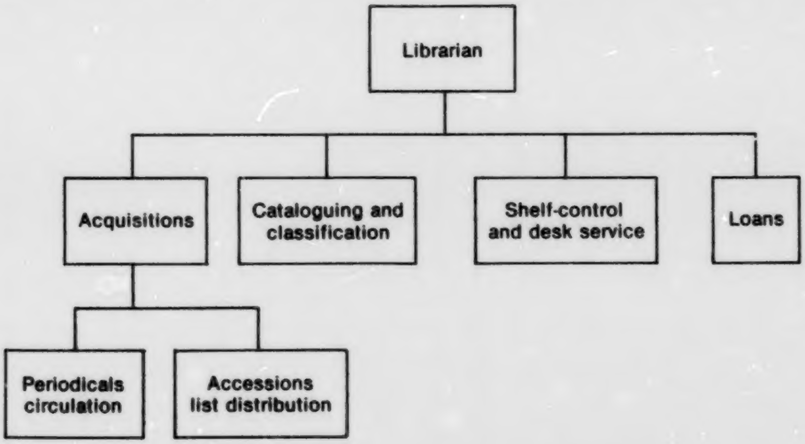
Librarian
Acquisitions
Cataloguing and classification
Shelf-control and desk service
Loans
Periodicals circulation
Accessions list distribution

Fig. 2. A custodial library with improved user services.

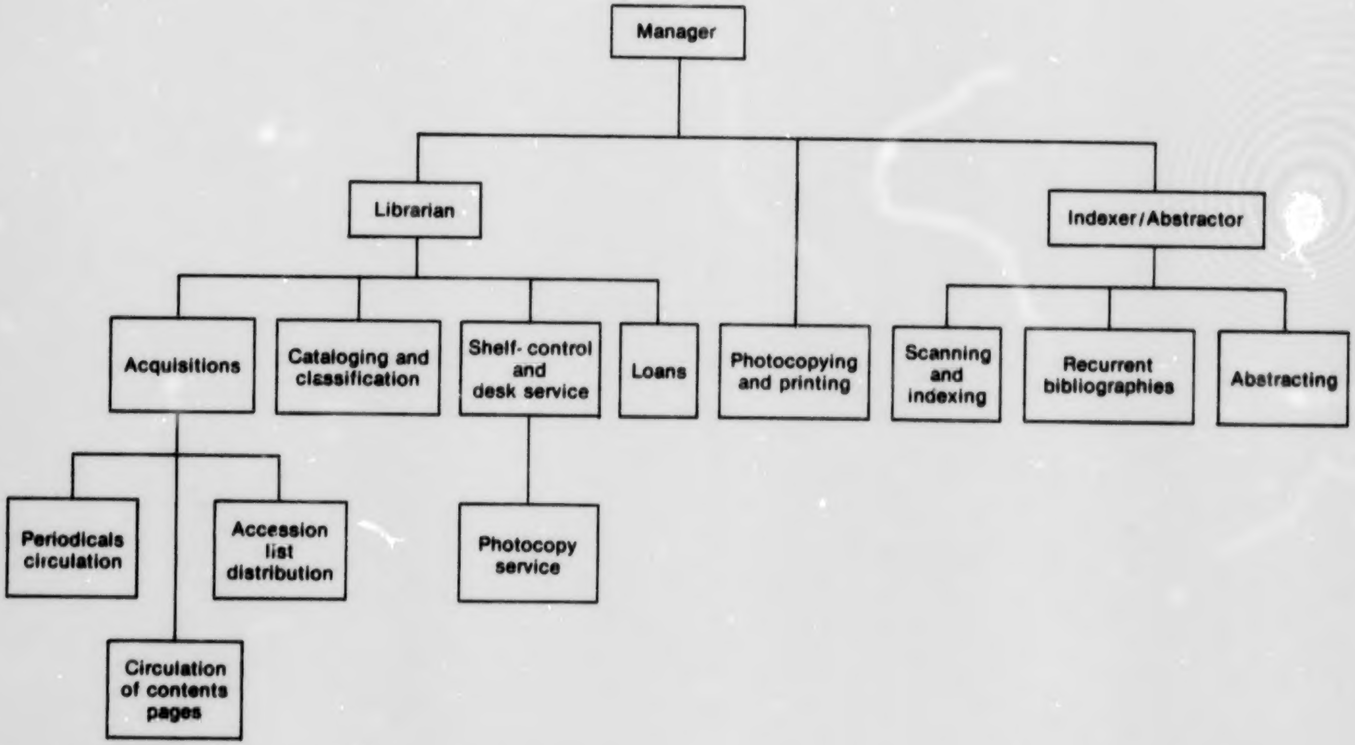
Manager
Librarian
Indexer/Abstractor
Acquisitions
Cataloging and classification
Shelf- control and desk service
Loans
Photocopying and printing
Scanning and indexing
Recurrent bibliographies
Abstracting
Periodicals circulation
Accession list distribution
Photocopy service
Circulation of contents pages

Fig. 3. A routine-service information centre.

- Providing access to storage shelves, either for staff only or all users; and
- Providing a desk service and giving guidance to users in shelf-browsing and catalog-using.

Additional components for a custodial library with improved user services (Fig. 2) include:

- Lending books and periodicals, including obtaining some material from other libraries;
- Circulating new periodicals to users routinely; and
- Duplicating and distributing an accessions list.

Additional components for a routine-service information centre (Fig. 3) include:

- Providing photocopies of documents on demand;

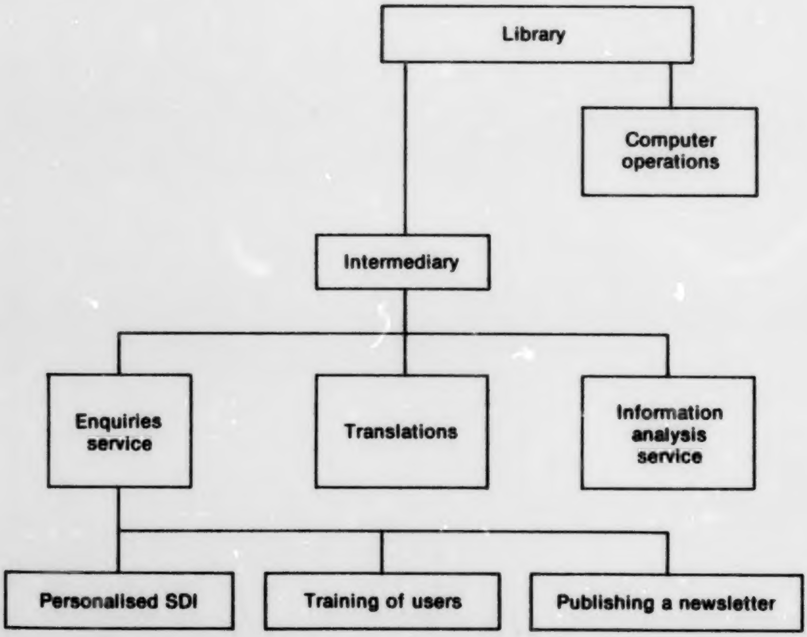
Library
Computer operations
Intermediary
Enquiries service
Translations
Information analysis service
Personalised SDI
Training of users
Publishing a newsletter

Fig. 4. A user-oriented information centre.

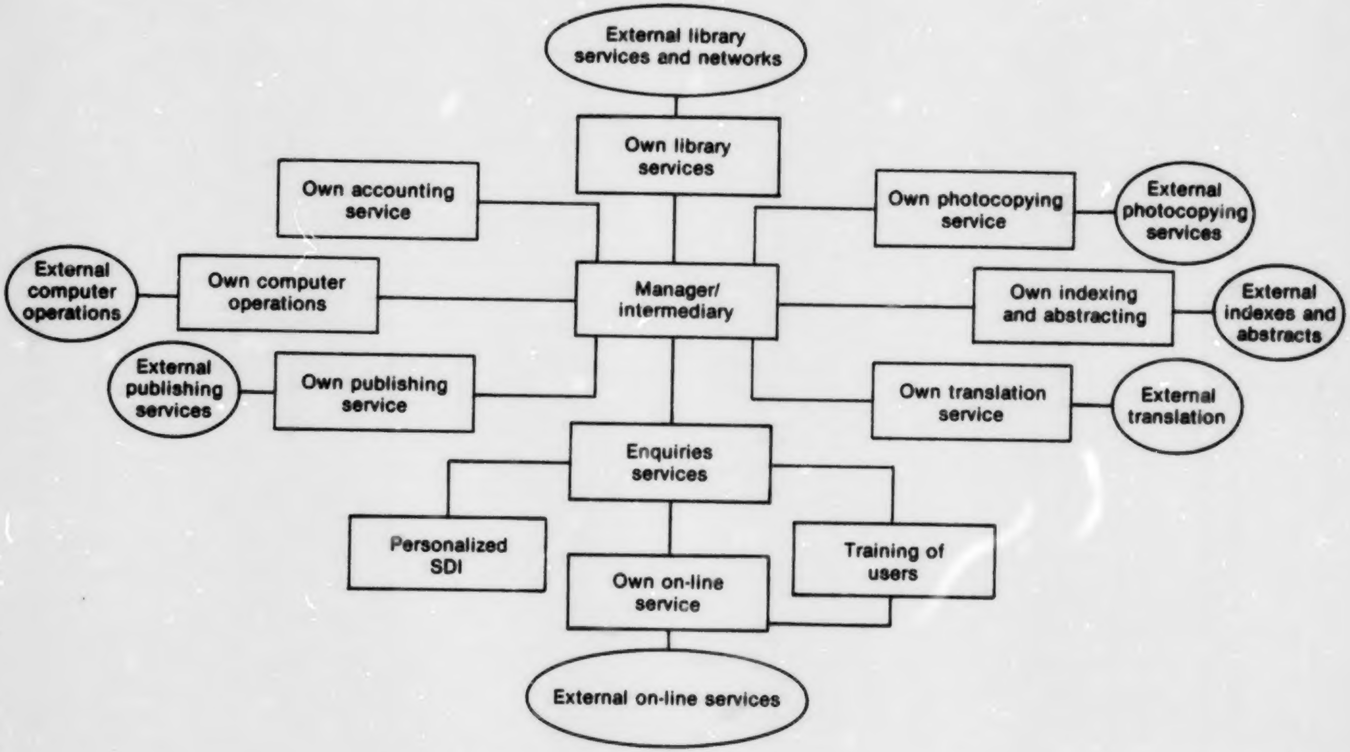
External library services and networks
Own library services
Own accounting service
Own photocopying service
External photocopying services
External computer operations
Own computer operations
Manager/ intermediary
Own indexing and abstracting
External indexes and abstracts
External publishing services
Own publishing service
Own translation service
External translation
Enquiries services
Personalized SDI
Training of users
Own on-line service
External on-line services

Fig. 5. An idealized user-oriented information centre.

- Circulating copies of the contents pages of new periodicals;
- Scanning new documents for information on specific subjects;
- Card-indexing selected documents on specific subjects;
- Compiling and distributing recurrent bibliographies; and
- Abstracting documents not abstracted by other organizations.

Additional components for a user-oriented information centre (Fig. 4) include:

- Answering enquiries via trained intermediaries (providing references, abstracts, photocopies of key documents, addresses of resource organizations, etc.);
- Training enquirers in searching techniques;
- Providing personalized or group SDI services;
- Providing a translation service;
- Providing an information analysis service ("packaged information"); and
- Publishing a newsletter with data about new services.

The management structure for an idealized user-oriented information centre is shown in Fig. 5.

STAR OR DISTRIBUTED NETWORK

M. Beckman

BACKGROUND OF NETWORKS IN CANADA

As in the United States, computer-based library networks have developed in Canada in the past decade. Begun as a sharing of automated cataloging schemes, communication technology now allows library users access to the resources and indexes of remote collections. Although this access can be through a network, it is not necessarily through a single one - or through two or three of the same kind.

The most important network service in Canada is that provided by the National Library and by CISTI, which is really the National Science Library. Because Canada is a very large country geographically (measuring 7600 km from one coast to the other), it would be impossible to attempt to have one centralized library network similar to the one in the United Kingdom. Instead, it has been agreed that the National Library should maintain a central bibliographic file of the holdings of all libraries/information centres for Canada, and that either regional or individual libraries would access that file for location information. The National Library has also agreed to maintain the source bibliographic files of catalog records from other national systems: Library of Congress (MARC), Bibliothèque nationale, and British National Bibliography. A network experiment is now being conducted to allow simple, direct on-line access to that file.

CISTI, as part of the national library network concept, serves as the centre for on-line retrieval and document delivery for scientific and technical information.

The other well known network in Canada is

UTLAS, which is a bibliographic utility similar to OCLC in the United States. It supplies catalog-support services to individual libraries, and facilitates a sharing of records and interlending among network members.

Less well known are the many local or regional networks, which may not have a formal network agreement, but share computer systems, data, and resources for the benefit of their own users.

NETWORK CHOICE: STAR OR DISTRIBUTED

The above examples illustrate the two types of network - star and distributed.

A star network has one or more central computers which maintain the bibliographic data base from which all the service comes. There may be intermediate groupings of libraries or centres between the library and the network centres, but these either facilitate the central service or provide additional services of a more regional character.

The distributed network is quite different. Each library or information centre maintains its own bibliographic files or its own automated system. It shares those files or gains access to others through direct telecommunication links to other nodes of the network. This is the form established by the academic libraries of Ontario and I will use these libraries to illustrate what I consider to be its advantages.

ONTARIO ACADEMIC LIBRARY EXPERIENCE

There are 15 university libraries in the province of Ontario, all supported primarily by the provincial government. Although there was to be central funding and coordination for the universities, it was agreed that the libraries would retain autonomy. Similarly, although the libraries were intended to share resources and technology, they were to do so on a cooperative basis, and to be self-sufficient at the undergraduate level.

Interlibrary Lending

Interlibrary lending has been a cooperative library activity in all jurisdictions for many years. Placing it within the Ontario academic library network meant only that forms had to be adjusted and protocols developed so that priority would be given to network members.

Interuniversity Delivery

In order to facilitate the sharing of resources, one of the first new network activities was to initiate a delivery system - a truck that traveled around most of the province on a schedule, picking up books, photocopies or film at one library and taking them on to the next. For libraries located close together, material could be picked up and delivered within 1 day.

Union Lists

With the interlending and document delivery systems working, attention was next given to access, that is, how each library could know what another library held. Several systems were developed, almost simultaneously, to address this problem:

- Union list of serials (the CUSS System),
- Union list of documents (the CODOC System),
- Union list of atlases, and
- Union list of microform sets.

All these systems are based on local records of systems, with each library contributing computer tapes or files from their own system or records for merging into a union file at stated intervals. For serials and documents, the tapes are from processing systems, whereas for atlases and microforms, they are simply updated files of records of materials in those formats.

The union catalogs for serials and documents are available either in COM/fiche or on-line through CISTI. The union list of atlases and microforms is produced in print copy.

Union Catalog

Because the union list systems were so successful, it was considered appropriate to move to a union catalog for books. However, when this was contemplated in Ontario in 1974, it was considered necessary technically to use one large central computer facility: no one local library could expect at that time to be able to mount the large source files, such as Library of Congress MARC, even though it was quite possible to process the serial and document systems on local university or library computers.

Accordingly, the Ontario network contracted with UTLAS, the Canadian bibliographic utility, to provide a union catalog support service. For the first time, therefore, the Ontario network was changing from a distributed local autonomy network to a star network. It is interesting to study the sequence of events which occurred.

Because one central facility was supplying services to all libraries, it was considered necessary to establish a network-coordinating office to deal with the utility (UTLAS) on behalf of the libraries. Because one of the benefits of the union catalog system was to be the sharing of cataloging data (thus reducing the amount of original cataloging necessary at each library), it was considered necessary to develop and implement standards of cataloging that were to be adhered to by all members of the network.

Several problems arose with the implementation of the union catalog system (UNICAT):

- Many libraries found it necessary to make expensive adjustments to existing catalog records in order to meet the standards;
- Other libraries found the standards lower than those they had been maintaining, which created incompatibility with existing files;
- Libraries with existing automated systems were not able to provide services that they had supplied previously (such as special bibliographies); and
- Similarly, with cataloging provided centrally, it was not possible to integrate the catalog system with existing circulation, acquisitions or serial systems in

each library.

The most serious problem, however, was cost. Not only did it cost to buy the service, but the Ontario network found the coordinating office increasingly expensive as it grew in size and activities (its staff of 2 in 1974 expanded to 11 by 1979). Moreover, the libraries themselves felt that they were no longer in charge of the network, as more and more responsibilities were taken over by the coordinating office.

It was therefore agreed in 1979 to dismantle the centralized network that had developed because of the union catalog concept, and return to the distributed network. Accordingly, the office was disbanded and responsibility for each activity was assigned to individual libraries. The concept of a union catalog in a central computer was abandoned in favour of local automated catalog systems, with direct telecommunication access links creating the necessary union file. One library could access another directly for any information sought from that library's data base.

Costs of the network decreased immediately, with no reduction in service. The union lists continue to be produced, direct interuniversity borrowing has been added to the interlibrary lending and document delivery systems, and the distributed union catalog system is in an active pilot project mode.

The latter, called iNET (for intelligent network), is coordinated by the National Library. Using telephone communication lines, libraries can access the National Library for data from the source files (MARC) and transfer them directly to the local files. Or they can access another library file in the network. Eventually, protocol defined for all libraries in the network will allow a request for information or data to speed to the library most likely to have the needed information. The speed of data transfer is such that a library user would not be aware that the request is moving from one library in the network to another until the answer is found.

ADVANTAGES OF THE DISTRIBUTED NETWORK

The distributed network has advantages in addition to lower cost:

- There is no need for an elaborate staff to coordinate a distributed network because there are no standards to maintain and monitor, no contracts to be negotiated, no forms to be followed. One or two meetings of the chief librarians each year suffice to discuss new ideas or projects and to review progress.

- Each library can proceed at its own speed, with primary responsibility directed to its own users, not others. Thus, it is possible to provide a local integrated system for circulation, reserves, acquisitions, serials, documents, archives, maps, as well as monographs, without the necessity of adapting to external standards. The automated systems that are so sensitive to local conditions (such as circulation and acquisitions) can operate unhindered by the requirements of other libraries.

- Distributed networks let local libraries take advantage of microprocessing technology, expanding services to users and further reducing the cost of operation. The large, centralized bibliographic utility networks (star) have so much invested in mainframe technology (even though outdated) that they cannot afford to switch to newer methodologies and take advantage of advances in technology.

- The distributed network is much more flexible, allowing individual libraries to enter into special relationships with a particular group of libraries (e.g., type or location) within the network without changing the character of the network itself.

CONCLUSIONS

It is essential that libraries have the flexibility to take advantage of the continuing developments in computer and telecommunication technology in order to serve their own users. A distributed network allows each library to operate as independently as is desired and yet at the same time share resources and data. Less expensive to operate, it is preferable to the more common star network.

COORDINATION AND NETWORKING: THE CHINESE CASE

Hwa-Wei Lee

This lecture is in two parts. The first part will review the recent development of library and information networks in China. The second part will be devoted to a discussion of the important considerations in the national planning for a coordinated and cohesive development of library and information networks, drawing on the experiences of lecturers and participants.

LIBRARY AND INFORMATION NETWORKS IN CHINA

A recent paper on Chinese library networks presented by Mr Xu Wenxu, Head, Secretary Research Group, China Society of Library Science, at the 48th IFLA General Conference in Montreal in 1982 (Xu 1982) describes the development of library and information networks in the People's Republic of China.

Early Stage of Network Development (1957-65)

After the adoption of the "National Books Coordination Program" by the State Council in September 1957, a national "Books Group" was founded to coordinate cooperative programs and projects. Led by the State Scientific and Technological Commission, the Books Group consisted of representatives from the Ministry of Culture, the Ministry of Higher Education, the Academia Sinica, the Ministry of Public Health, the Ministry of Geology, the National Library of Beijing (renamed National Library of China in 1981), and several library experts.

Followed by the establishment of the Books Group, two national central libraries committees were founded - one in Beijing and one in Shanghai. At the regional level, nine central libraries committees were also founded in the cities of Wuhan, Shenyang, Nanjing, Guangzhou, Chengdu, Xian, Lanzhou, Tianjin and Harbin. Each of these committees was composed of those local libraries having the most substantial collections and well-founded services.

Tasks of the central libraries committees

The major tasks of these committees, including the two national central libraries committees, were:

- To assist in the organization and planning of library service for the major scientific research departments;
- To study and resolve problems concerning the division of labour and cooperation in acquisition, exchange of publications and duplicates, interlibrary loan, etc.;
- To develop programs for centralized cataloging, compilation of union catalogs, and reporting on new publications; and
- To initiate programs for the upgrading of the professional level of library staff and for the promotion of spare-time education.

Many of the tasks were carried out by the committees between 1958 and 1965 and resulted in substantial improvement in library service. The destructive Cultural Revolution (1965-76) not only wiped out the initial gains from the network development but caused serious setbacks in library resources and services.

Revival of Network Development (since 1976)

After 1976, library service in China entered a period of recovery and progress. Many of the central libraries committees resumed their work in the form of temporary cooperative committees or cooperative groups. The Library Coordination Group in Beijing (founded in 1977) has 18 member libraries, comprising all major public, academic, and research libraries. The Chinese Society of Library Science was reestablished in

1979.

Formation of nationwide committees

The following committees have been formed since 1976:

- Technical Committee of National Standards, founded in November 1977, has been concerned with the standardization of microform techniques, transliteration, technical terms of varying subject fields, thesaurus and indexing, catalog entries, publication format, equipment, etc.
- Publishing, Books, and Information Committee was founded by the Academia Sinica in 1980.
- University and College Library Service Committee, which was founded by the Ministry of Higher Education in 1981, is comprised of representatives from 50 institutions of higher education.

Administrative Bureau of Library Affairs

To provide central leadership in the planning and development of the nation's public libraries, the Ministry of Culture established the Administrative Bureau of Library Affairs in 1980.

A 1980 report showed that, of the 2100 county governments in the country, only 1300 (or 62%) of them have a county library. To reach the goal of one county library in every county, much effort is still needed.

Basic Library Tools Compiled

The following two basic cataloging tools are currently in use by 90% of the libraries and information institutes in China. One is Classification - A System in Use in Chinese Libraries. The first edition appeared in 1975 and the revised edition in 1980. It is divided into five main parts, 22 first-class categories, and over 25,000 subdivisions. The other is Chinese Cataloging Rules for Books and Documentation.

Another basic tool that is very necessary for information processing and retrieval is the Chinese Thesaurus. Published in 1981, it comprises a total of 90,000 descriptors and 17,000 nonusing descriptors. There are 58 categories in its index - 15 in social sciences and 43 in natural sciences.

Leadership Role of the National Library of China

The largest and most prominent library in China, the National Library of China (formerly the National Library of Peking), has been functioning as the national library for a long time.

Objectives

The National Library not only provides specialized services to leading departments of the party, the government, the army, and research institutions, as well as for major production projects, but also serves the general public in an effort to raise the cultural and scientific awareness of the people.

Organization

The Library has been organized into eight functional and four administrative units.

The functional units (all are departments) consist of: Acquisitions, Cataloging, Reading Rooms and Circulation, Reference and Research, Periodicals, Newspapers and Serials, Rare Books and Special Collections, Centralized Cataloging, and Library Science Research.

The administrative units include: Political Department, Administrative Office, Capital Construction Office, and General Affairs Department.

Staff and collections

In 1979, the Library had a staff of 800 members (Fang 1981). Its collection included 9.8 million volumes of books and periodicals, 13,000 current periodical titles, 580,000 volumes of rare books and manuscripts, and many other items. The Library serves as a depository for all publications within mainland China, and receives three copies of every title published.

Publications and bibliographic services

The Library compiles and publishes 11 specialized bibliographies and indexes, including a monthly New Books Catalog of the PRC (Quan Guo Xinshumu). The latest project is the preparation of the National Union Catalog of Ancient Classical Books (Chuan Guo Guji Shan Ben Shu Zongmu), which was expected to be completed in 1982.

Its Centralized Cataloging Department provides catalog cards for new books in Chinese and foreign languages to some 5000 libraries in China. In 1980, over 17 million such cards were distributed.

Future Plans

Future plans in networking include the following:

- To develop a multifunctional library network with adaptability and centralized coordination;

- To further develop the five types of libraries currently in existence, i.e., public libraries, scientific research libraries (including those belonging to government institutions), university and college libraries, labour union libraries, and armed forces libraries;

- To enlarge the scope of organization within each of the five types of libraries (as well as among them) in order to create a closely interwoven nationwide library network;

- To keep the library networks in step with the development of information networks;

- To build a number of documentation retrieval centres and data bases in the shortest time possible, thus forming a nationwide network of publications, documentation, and computers; and

- To adopt modernized means to render more effective the national and international resources sharing.

Role of ISTIC

Like many writings on libraries in China, Xu's paper made no mention of the Institute of Scientific and Technical Information of China (ISTIC), the largest information centre and perhaps one of the most important components in the national library and information networks in China.

The following information on ISTIC was obtained from a recent article written by Nie Chunrong, former Director of ISTIC (Nie 1980).

Objectives

Founded in 1956, ISTIC is a national comprehensive information centre. The principal objectives of ISTIC are:

- Acquisition and systematization of foreign scientific and technical literature;
- Study and analysis of foreign scientific and technical achievements, as well as the reporting of new trends in scientific research and development;
- Exchange of information about a popularization of domestic scientific and technical results, new techniques and experiences; and
- Investigation of domestic and foreign scientific and technical information theory, methods and experiences with a view to making them serve the overall socioeconomic and technical development of China.

Organization

To achieve the above objectives, ISTIC has set up the following sections:

- Acquisitions Department,
- Library of Foreign Scientific and Technical Literature,

- Library of Chinese Scientific and Technical Literature,
- Library of Patent Specifications,
- Library of Standards,
- Library of Product Specifications and Samples,
- Library of Audiovisual Materials,
- Referral Service Office,
- Department of Domestic Scientific and Technical Information Interchange,

Department of Information Methodology,

- Computer Group,
- China Scientific and Technical Document Reproduction Company, and
- Scientific and Technical Document Publishing House (with a printing shop).

Staff and collections

Currently ISTIC employs over 1000 staff, including 600 professionals. In addition to the main centre in Beijing, ISTIC also has a branch in Chongqing.

The foreign collections consist of 7000 periodical titles, 600,000 research reports, conference proceedings and transactions, and dissertations, 6 million patent specifications, 300,000 standards, and 300,000 product specifications.

Publications

ISTIC's publications include:

- Bibliographies, such as Guowai Ziliao Guancang Mulu (Bibliography of Foreign Literature Collections);

- Translations, such as Guowei Keji Dongtai (Status and Trends of Foreign Science and Technology), a translation of the latest foreign scientific articles and news; and

- Reviews, which carry articles on the state of the art in certain scientific disciplines and techniques, and are based on the analysis of relevant scientific and technical literature.

National network

As a result of the First National Conference on Scientific and Technical Information Work held in 1958, all professional ministries of the central government established their own specialized scientific and technical information institutes, with provinces, municipalities and autonomous regions following suit. The interrelationship and collaboration of these central and local scientific and technical information institutes throughout the country paved the way for the exchange of information and facilitated the rapid dissemination of scientific and technical literature for the benefit of all concerned.

International activities

ISTIC is actively involved in the international exchange of scientific and technical information and has been designated by the government to represent China at UNESCO's General Information Programme and to participate in its UNISIST activities.

BASIC CONSIDERATIONS IN DEVELOPMENT OF A NATIONAL LIBRARY AND INFORMATION NETWORK

The first part of this lecture reviewed the development of library and information networks in China, based largely on information provided by three recent papers. China appears to have done reasonably well, both before and after the disastrous Cultural Revolution, in developing her national infrastructure for library and information services. This part of the lecture is devoted to the important considerations for future development, drawing on the experience of lecturers and participants.

Major Considerations

In accordance with the UNESCO guideline (UNESCO 1976), the following framework for discussion is suggested:

- Establishing a central planning and coordinating body most suitable to China's existing conditions and requirements;
- Deciding on goals and objectives of the national library and information network;
- Designing the network model most appropriate to China's current and future needs;
- Building the apparatus for the whole range of national bibliographic, indexing and abstracting services;
- Planning for the application of new computer, information, and telecommunication techniques to the nation's library and information networks for maximum cost-effectiveness;
- Implementing education and training programs to meet the personnel needs; and
- Participating in international cooperative programs and networking.

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SCIENTIFIC INFORMATION EXCHANGE AND TRANSFER OF TECHNOLOGY: A REVIEW OF THE PRINCIPLES

K.P. Broadbent

Scientific and technical information services have to draw heavily on information in sectoral systems, such as those related to agriculture, industry, and natural resources; at the same time, they need to cooperate in the exchange of information with one other.

A national information infrastructure includes a variety of institutions, facilities and services, such as policymaking bodies, technological information services, documentation centres, libraries of universities or centres of excellence, and the end-users of information. Thus, there is a need for functions at the national level for such matters as:

- Identification of end-users and their needs,
- Information policy formulation and implementation,
- Training and advice,
- Information resources and source identification,
- Information delivery and extension services,
- Referral services, and
- Translation and printing.

IDENTIFICATION OF END-USERS AND THEIR NEEDS

Scientific and technical information should be relevant and appropriate in the sense that it must suit the particular circumstances and socioeconomic objectives of the country in which it is to be applied. This necessarily implies a selection of priorities, which in turn implies that the end-user is to choose the most appropriate technology. To make a choice, the end-user necessarily requires alternatives, as well as information about the alternatives.

Once a choice of technology is made, further information is required in order to identify the most suitable source of the technology to be acquired (within or outside the country), and to adapt available technology and develop new technology.

Regarding appropriate technological information, the following problems are often encountered by end-users in developing countries:

- There is either no information or not enough relevant information;
- There is too much information;
- The availability of information is unknown to end-users; or
- Available information is inaccessible because of complexity, costs, confidentiality, language or other economic, social, cultural or political barriers.

It is of great importance, however, to realize that the end-users of technological information are by no means a homogeneous group; information that is relevant and accessible to one sort of user may be of no use to another. Thus, the solution to the problems above may be different for each end-user category; indeed, the functions of an information exchange network should correspond to the specific needs of these different end-users.

Users may be classified in a number of different ways. There are those responsible for making decisions; technologists responsible for the operation and management of industrial and technological plants, as well as training; technicians who require knowledge of skills; and persons in rural areas who may require information which has been repackaged from its original form so as to be applied to development in their particular environment. There are three major categories of end-users of technological information:

- End-users at the national, political or institutional level, including planners, decision-makers, negotiators, researchers, teachers and students, and others who do not themselves apply the technology. A major need of these end-users is access to information, or information on information, that will enable them to choose between alternative technologies, to identify consultants and researchers, research institutions, programs and results, to more effectively negotiate the transfer of technology, to learn from the experiences of other countries in technology matters, to design training programs, etc.

- End-users who apply technology, such as managers, engineers, physicians, etc. These end-users usually have adequate channels of communication at their disposal and the capacity to absorb complex technological data. Joint ventures in the manufacturing sector are an example of how information is channeled. Information needs may relate to intellectual property rights, the range of available capital goods, abstracts of recent technical literature, technological aspects of management, applied research results, new products and processes, improved tools and machines, etc.

- End-users of technology in the less sophisticated, smaller-scale, informal sectors of urban and rural areas - that is, the majority of the population in developing countries yet unable to satisfy their basic needs.

One of the reasons that basic needs are not always met lies in the use of inappropriate technologies. Information delivery should start from the premise that information should be adapted to the requirements, capabilities and means of the user, rather than vice versa.

In the development of any national information system in most countries, there should be a governmental authority or body with responsibility for policy guidance in the information field. Typical of the kinds of organizations that might undertake such responsibilities for technological information are the UNISIST focal points which have been established in many countries.

POLICY FORMULATION AND IMPLEMENTATION

In the formulation of national policy, there are at least five basic principles:

- The ability to acquire and cultivate indigenous scientific and technological knowledge is one of the prerequisites for the promotion of technological progress and self-reliance. At the same time, it must be recognized that the transfer of technological information is only one component of the overall technology transfer process. This fact also leads to the conclusion that the development of national information policy should form an integral part of national socioeconomic and technological policies.

- In planning activities related to the collection, analysis and dissemination of technological information, governments should take into account the fact that a large part of modern technology is of a proprietary nature. For this reason, the improvement of conditions of transferring technology from abroad is of high priority for all developing countries. Thus, the establishment of technological information exchange systems needs to take into account the work being undertaken in UNCTAD in connection with the Code of Conduct on Transfer of Technology, and in WIPO regarding the revision of the international patent system, as well as relevant work being carried out by other organizations.

- The establishment and development of national systems for the exchange of technological information will play a crucial role in supporting any international network.

- Information made available should be user-oriented. Stockpiling of information has no value in itself.

The guiding principle should allow users to select the necessary amount of information in readily usable form. Information should be relevant to the country's priorities regarding economic and social development, and should be useful to the end-users.

- The form in which technological information is transferred abroad or disseminated inside the country should be such that the information can be assimilated by the end-users. In particular, it should take into consideration the language, customs, and other practical peculiarities of the users to whom it is directed.

Related to the need for information policy is the need for methods and standards that can be used by all organizations involved in information-related activities. These include the standardization of terminologies, nomenclature, subject and source coverage, classification schemes and communications media. The work done by the World Information System for Science and Technology (UNISIST) Programme of UNESCO, as well as by other international organizations, would provide a framework to encourage information exchange at the national level and the interconnection of systems at regional and international levels.

TRAINING AND ADVICE

Adequate provision should be made for facilities to train information users at all levels to ensure that services provided are used to the best advantage and investments are not wasted.

INFORMATION RESOURCES

The importance of national inventories needs to be stressed. Sufficient information on existing national resources and sources is often unavailable, so that users simply do not know where to go to research a given topic. Very often a source of information is available but no one knows what services may be provided.

There are usually two kinds of structural organization. One consists of every facet of information

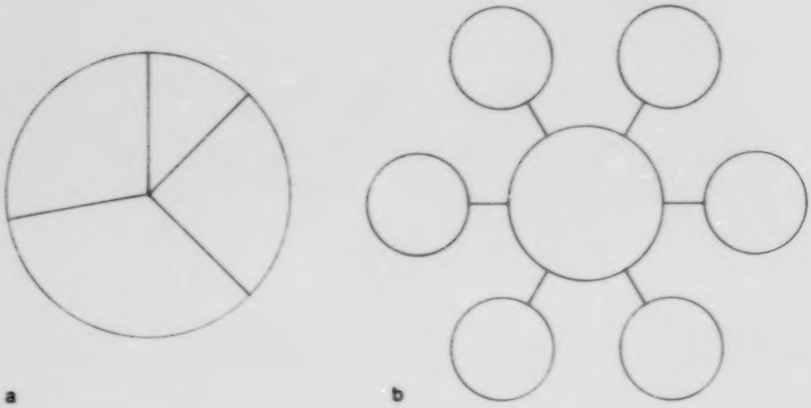

Fig. 1. Structural organizations: a, sectoral division; and b, central body with satellites.

broken down sectorally. An example of this would be the National Information Centre for Science and Technology (Fig. 1a). The second is a central body that decides policy, plans and implements decisions and has overall responsibility for satellite special libraries or information centres already established as collection points for specific documents (Fig. 1b).

INFORMATION DELIVERY AND EXTENSION SERVICES

In many countries, there is a very serious shortage of expertise in the area of information delivery and extension services. It is therefore highly desirable to maximize the benefit from existing expertise. Linking a country's scientific and technological information system to an international information system could make it possible to share scarce information resources, equipment and specialized personnel.

To fully utilize the limited funds available for procuring and disseminating information, information institutions should make efforts to cooperate in the creation of a decentralized national pool of information resources, from which the various sectors can draw.

An essential tool for the operation of such a pool would be a national inventory.

REFERRAL SERVICES

Referral services link seekers of information with sources that are able and willing to provide the necessary information. A prerequisite for an effective referral service is an array of directories and union lists that can be used to identify the source, location and availability of any desired information in a particular field. Using these services, a referral centre can advise the seeker of information as to where his/her needs are most likely to be met. Such needs might be met with information held by an institution within the country, provided that the relevant lists and catalogs have been prepared - a task which is normally the responsibility of the national information system. If not, foreign sources can be contacted with the help of appropriate reference publications.

Referral services are provided by designated referral centres. In any country, one or more referral centres may be designated to respond to requests for technological information. Existing national institutions responsible for the collection, processing, storage and dissemination of technological information can provide referral services; hence, it may not be necessary to create new institutions to do so. In the establishment of referral services, the experience gained by the International Referral Systems (IRS) or United Nations Environmental Programme (UNEP) should be used to the best advantage.

TRANSLATION, PRINTING AND REPROGRAPHIC SERVICES

It is necessary in any information system to ensure that scientific and technological information is made available to users in their own language. This poses a difficult problem because a very large part of scientific information is published only in major European languages. Information systems and services, therefore, need to make provision where necessary to facilitate (at the national level and perhaps at the regional level) translation into the local language.

There are problems related to the question of translation, namely, the need to develop glossaries of technical terms in the local language and the printing of multilingual dictionaries and thesauri.

Information systems should provide for the dissemination of information to users through such media as printing and microforms. Many countries lack the necessary equipment and material due to foreign exchange difficulties, and need additional specialized help to handle such services. Action is therefore required to strengthen these services, especially training in reprography.

TECHNOLOGY TRANSFER CENTRES

Centres for the transfer and development of technology should be viewed as being major priorities for the exchange of technological information. The following are among the more important activities such centres should perform:

- Identification of technological information needs and sources, as well as facilitating the collection, analysis, packaging and dissemination of technological information of all kinds;
- Provision of information handling, advisory assistance, training, translation and selected services;
- Evaluation, adaptation and development of technology, and provision of advice and information on packaging technologies, technological alternatives and appropriate technologies; and
- Advising and cooperating with national and regional technological centres and maintaining current awareness of their activities; encouraging and taking part in interregional activities that are aimed at establishing technological information networks and services.

QUESTIONS AND ANSWERS ABOUT THE OHIO COLLEGE LIBRARY CENTER

Hwa-Wei Lee

GENERAL INFORMATION

What is the Evolution of the Name "OCLC"?

The letters "OCLC" originally represented the Ohio College Library Center, which was incorporated in 1967 to develop a cooperative, computerized regional network for its 54 member college libraries in Ohio. In 1977, the corporation changed its name to OCLC, Inc., to reflect its expansion of services to academic, public, special, and federal libraries throughout the United States and in several foreign countries. In 1981, the legal name became OCLC Online Computer Library Center, Incorporated.

Where is OCLC Located?

In February 1981, OCLC moved into its newly constructed centre in Dublin, Ohio. It is located at 6565 Frantz Road, minutes from northwest Columbus near I-270 and State Highway 161.

What Does OCLC Do?

OCLC has designed and now operates a bibliographic computer and telecommunications system that supports resource sharing among libraries. OCLC is also developing local automated library systems that will permit independent processing by libraries and library clusters.

Participating libraries use the OCLC Online System to catalog books, serials, and other library materials; to order custom-printed catalog cards; to create machine-readable data files; to maintain location information on library materials; and to facilitate interlibrary lending. The system provides bibliographic and location information to participating libraries and produces bibliographic information in the form of magnetic tapes and printed lists.

What are OCLC's Goals and Objectives?

OCLC's goals are to reduce the rate of growth of per-unit costs in libraries and to increase the availability of library resources to library patrons.

OCLC's computerized library system supports integrated subsystems by means of the following objectives:

- Increase the availability of library resources to library patrons;
- Lower the rate of growth of per-unit costs in libraries;
- Furnish patrons and library staff with information when and where it is needed;
- Enable patrons to receive personalized service; and
- Provide management information.

What are the Features of OCLC's Bibliographic Data Base?

OCLC's data base, the Online Union Catalog, contains bibliographic information created by the cooperative cataloging efforts of participating libraries nationwide. Bibliographic records in the Online Union Catalog are derived from information entered by libraries participating in OCLC, and from the Library of Congress and National Library of Medicine. OCLC users contribute over 75% of the bibliographic records in the Online Union Catalog; the remaining records are contributed by the national libraries.

Libraries locate records in the Online Union Catalog for 94% of the items they search. In other words, 94% of the time, libraries can use records already in the data base rather than enter new records.

The composition of the records in the Online Union Catalog as of April 1982 was: 85.4% books, 6.3% serials, 2.3% films (AV), 2.5% sound recordings, 2.0% music scores, 1.2% maps, and 0.3% manuscripts.

The language distribution of the records in the Online Union Catalog is: 75.1% English, 6.2% German, 5.4% French, 4.7% Spanish, and 8.6% all others.

How do the Individual Subsystems Operate?

The Cataloging Subsystem provides bibliographic information essential to other subsystem activities. A user retrieves bibliographic records (containing information similar to that on catalog cards) from the Online Union Catalog by typing simple search commands at a terminal keyboard. These records, retrieved from the system and displayed on the terminal screen, may be used as they appear. Or they may be edited to conform to an individual library's cataloging practices, without being altered in the Online Union Catalog.

Libraries contribute new bibliographic records to the Online Union Catalog by typing the necessary information on a blank workform displayed on the terminal screen. When a library catalogs its bibliographic materials through the Cataloging Subsystem, the system automatically adds to the record that library's unique three-character symbol assigned by OCLC. These location symbols identify libraries that have used that record for cataloging.

The Interlibrary Loan Subsystem increases the availability of library resources to patrons by enabling libraries to draw upon resources from other libraries. Libraries create, transmit, and fill loan requests through on-line interlibrary communication. Potential lending libraries are identified by their unique three-character location symbols attached to bibliographic records. The Interlibrary Loan Subsystem also provides improved record-keeping and reduces the actual time and cost associated with interlibrary loan activities.

The Serials Control Subsystem provides library staff and patrons with on-line access to up-to-date, detailed, copy-specific holding and location information for serial publications cataloged through the Cataloging Subsystem. Based on a title's frequency of publication, the system predicts and displays the next expected issue and date of receipt; it also identifies any missing issues.

The Serials Union Listing Component supports the efforts of groups creating and maintaining national and regional serials union lists. With this capability, libraries in union list groups can enter and display their summary serial holdings in the Serials Control Subsystem.

The Acquisitions Subsystem supports the ordering, receiving, and claiming operations in the acquisition of library materials. It also provides administrative and planning data, including fund accounting and reporting. Using information entered in the Online Union Catalog when an item is ordered, library staff can promptly catalog and process the item when it arrives at the library.

The Name-Address Directory is available to users who require access to mailing or communication information. This on-line file contains names, addresses, lending policies, and other information about libraries, publishers, vendors, professional associations, and other organizations affiliated with the information industry.

To ensure consistency within its data base, OCLC has made available on-line Library of Congress (LC) name-authority records. LC distributes name-authority records for personal, corporate, conference, and geographic names, and for uniform title headings. The records include established headings, "see from" references, "see also from" references, and notes.

What Hours Does the Online System Operate?

The Online System operates 87 hours per week: Monday through Friday, 7:00 a.m. to 10:00 p.m.; and Saturday, 8:00 a.m. to 8:00 p.m.

When Did the Subsystems Become Available?

OCLC began operation in 1967 and in August 1971 went on-line with its shared Cataloging Subsystem. In January 1975, the Serials Control Subsystem went on-line, and in April 1979, the Interlibrary Loan Subsystem went on-line. The Name-Address Directory was made generally available to users in the fall of 1980. The Acquisitions Subsystem was installed in January 1981 and made generally available in July 1981.

How is OCLC Organized?

OCLC has an Executive Office, Office of Planning and Research (within the Executive Office), and the following divisions: Administrative Services, Marketing and User Services, Finance and Business Planning, and (within Online Operations) Computer Facilities, and Development.

How is OCLC Governed?

Decision-making powers on policy and budget reside in a 16-member Board of Trustees including the President of OCLC; five members from the professions of business, law, government, or finance; three Board-elected members from the library profession; and six members from the OCLC Users Council.

Members of the Users Council represent those networks, systems, consortia, or groups of libraries participating in the OCLC Online System. These members are elected by general members of OCLC - all libraries, public or private, academic or nonacademic, that participate in the OCLC Online System.

What are Regional Networks?

Regional networks are independent local organizations that contract with OCLC to provide OCLC services to their member libraries. OCLC supports and endorses the concept of regional networking. Network offices provide the basic means by which users of the OCLC system receive support services such as training and technical assistance. Currently, there are 21 regional networks and 3 OCLC service centres:

Association for Library Information (AFLI)
Duquesne University Library
Pittsburgh, PA 15219
(412) 434-6138

AMIGOS Bibliographic Council (AMIGOS)
Suite 321
11300 North Central Expressway
Dallas, TX 75243
(214) 750-6130

Capitol Consortium Network (CAPCON)
Suite 412
1776 Massachusetts Avenue NW
Washington, DC 20036
(202) 785-0700, 0701

Cooperative College Library Center (CCLC)
Suite 602
159 Ralph McGill Boulevard NE
Atlanta, GA 30365
(404) 659-6886

Five Associated University Libraries (FAUL)
757 Ostrom Avenue
Syracuse, NY 13210
(315) 423-3021

Federal Library Committee (FEDLINK)
Library of Congress
Washington, DC 20540
(202) 287-6055

ILLINET Bibliographic Data Base Service (ILLINET)
Illinois State Library
Centennial Building, Room 537
Springfield, IL 62756
(217) 785-1532

Indiana Cooperative Library Services Authority (INCOLSA)
1100 West 42nd Street
Indianapolis, IN 46208
(317) 926-3361

Bibliographical Center for Research (BCR)
Suite 212, 245 Columbine
Denver, CO 80206
(303) 388-9261

BCR Eastern Office
Watson Library
University of Kansas
Lawrence, KS 66045
(913) 841-0400

NELINET, Inc.
385 Elliot Street
Newton, MA 02164

OHIONET
1500 West Lane Avenue
Columbus, OH 43221
(614) 486-2966

PALINET
3401 Market Street, Suite 262
Philadelphia, PA 19104
(215) 382-7031

Pittsburgh Regional Library Center (PRLC)
Chatham College - Beatty Hall
Pittsburgh, PA 15232
(412) 441-6409

Southeastern Library Network (SOLINET)
400 Colony Square, Plaza Level
1201 Peachtree Street NE
Atlanta, GA 30361
(404) 892-0943

State University of New York (SUNY)
State University Plaza
Albany, NY 12246
(518) 474-1430

Wisconsin Interlibrary Services (WILS)
464 Memorial Library
728 State Street
Madison, WI 53706
(608) 263-5051

MIDLNET/OCLC Office
c/o Maryville College
13550 Conway Road
St. Louis, MO 63141
(314) 576-6710

Minnesota Interlibrary Telecommunications
Exchange (MINITEX)
30 Wilson Library
309 19th Avenue South
University of Minnesota
Minneapolis, MN 55454
(612) 376-3926

Michigan Library Consortium (MLC)
Suite 8, 6810 South Cedar
Lansing, MI 48910
(517) 694-4242

Nebraska Library Commission (NEBASE)
1420 P Street
Lincoln, NE 68508
(402) 471-2045

SERVICE CENTRES

OCLC Europe
2nd Floor
Lloyds Bank Chambers
75 Edmund Street
Birmingham, B3 3HA United Kingdom
021 236 3224 5

OCLC Western
9th and Dartmouth
Claremont, CA 91711
(714) 621-8046

OCLC Western, Pacific Northwest
P.O. Box 03376
Portland, OR 97203
(503) 283-4794, 283-4830

How Many People Work at the Center?

As of June 1982, OCLC had a staff of over 500.

Employment enquiries should be directed to the Manager, Human Resources Department, OCLC, 6565 Frantz Road, Dublin, OH 43017; telephone (614) 764-6000.

How Many Libraries are Members of OCLC?

OCLC currently has over 3300 member libraries, nearly 60% of which are academic libraries. (Academic libraries account for over 65% of all cataloging done in the United States.) Indirectly, OCLC serves a total of 6000 libraries.

Do Libraries Outside the United States use OCLC's Online System?

Several libraries outside the United States use OCLC's Online System, including libraries in Australia, Canada, Finland, Mexico, the United Kingdom, and West Germany.

At What Rate are New Users Joining OCLC?

About 20 to 30 new users join OCLC each month.

How Many OCLC Users Have OCLC Terminals?

Approximately 2200 libraries have OCLC terminals. Over 700 other libraries have dial-access terminals and access OCLC through TYMNET or direct dial. Some libraries share terminals with other libraries, others are customers of processing centres, and still others have several terminals.

Over 5000 OCLC terminals are linked to the OCLC Online System. Terminals are added to the network at the rate of 50 per month. This increase is controlled so that the system can maintain acceptable response time.

What is the Average Number of OCLC Terminals per Library?

The average number of terminals per library is 1.8.

What is the Size of the OCLC Data Base, and at What Rate has it Grown?

The number of records in the data base has increased as follows:

1 million	September 1974
2 million	February 1976
3 million	May 1977
4 million	June 1978
5 million	May 1979
6 million	February 1980
7 million	December 1980
8 million	December 1981

The Online Union Catalog currently contains approximately 8.5 million records.

At What Rate is the Data Base Growing?

The data base is currently growing at the rate of about 24,000 bibliographic records weekly. Of these, about 19,000 records are contributed by users; the remainder are derived from Library of Congress and National Library of Medicine MARC records, which are added to the system weekly.

How Many Location Symbols Are in the Data Base?

There are over 113 million location symbols in the data base associated with approximately 8.5 million bibliographic records. Location symbols identify the libraries that have used a record for cataloging. Each bibliographic record averages 13 location symbols.

How Large is the Average Bibliographic Record?

An average record has 513 characters.

How Many Catalog Cards Does OCLC Produce?

OCLC produces nearly 2.5 million cards per week. On the average, 10.2 cards are produced when a library uses a record for cataloging and requests cards.

How May a Library Participate in OCLC?

To best suit its needs, a library may participate in OCLC in any of three ways. It may be a participant if it does all its Roman-alphabet cataloging on-line or by tapeload. It may be a special user if it uses the on-line system but does not qualify as a participant (examples are CONSER participants, national libraries, and library schools). Or it may be a partial user if it is a participating library that utilizes the on-line system features but does not contribute its Roman-alphabet cataloging to the OCLC data base. Partial users have restricted access to the on-line system and pay higher fees than participants.

How Many Interlibrary Loan Transactions are Filled per Week?

An average of 25,000 interlibrary loan requests are entered in the Interlibrary Loan System each week. Of these, 86% are filled, and requested items are shipped to the borrowing library usually in 6 days. Nearly 90% of the requests use information in the Online Union Catalog to create interlibrary loan records.

FINANCIAL INFORMATION

What Are the Features of OCLC's Not-for-Profit Status?

OCLC was chartered in the state of Ohio. It is a not-for-profit corporation organized to establish, maintain, and operate a national computerized network of bibliographic cataloging services for libraries, and to promote the evolution of library use, of libraries themselves, and of librarianship. The corporation has obtained tax-exempt status under Section 501(c)(3) of the Internal Revenue Code of 1954.

OCLC does not issue stock, provide dividends, or share profits. Although OCLC is a not-for-profit corporation, it is not subsidized. Its income must exceed expenses to finance expanding services, to purchase additional equipment, to fund research and development projects, and to meet obligations of bond issues used to finance capital equipment requirements.

How is OCLC Financed?

From 1967 to 1971, OCLC's activities were supported by membership fees paid by Ohio libraries. OCLC received grants for specific research and development projects from the United States Office of Education, the Council on Library Resources, Inc., the State Library of Ohio, and the National Agricultural Library. Since 1971, grants have constituted less than 2% of OCLC's revenues.

In June 1979, a $38.5 million Industrial Revenue Bond (IRB) was issued to refinance existing commercial indebtedness; the remaining funds were used to purchase land, construct a new building, and purchase computer equipment.

How has OCLC Grown Financially?

OCLC's revenue has increased from $67,000 in 1967 to almost $31 million in 1981. The corporation's assets have grown from $62,000 in 1967 to $65.9 million in 1981, the latter figure due to a $38.5 million issuance of Industrial Revenue Bonds to finance the construction of the new Center and other capital purchases.

What Expenses Does a Library Incur for Use of the Cataloging Subsystem?

OCLC charges fees for use of the Cataloging Subsystem and its products and processes. A library is levied a per-terminal service fee plus a charge for the initial use of a bibliographic record in the data base (if the record was not entered by that library).

OCLC's pricing structure is based on the use of records already in the data base, not on the system resources used, that is, not on connect time or computer time. (As an exception, in addition to the cataloging charge, dial-access users are charged per connect hour.) Charges are reduced for libraries that add their holdings to existing records as part of a recognized conversion project; original cataloging (i.e., entering new bibliographic records) is not charged.

Other expenses include catalog cards, terminal costs, telecommunications costs, service fees, and any additional surcharge by a regional network.

Additional charges may be added by a regional network to cover network operating costs. OCLC directly bills only those libraries that do not belong to a network, i.e., independent members. Otherwise, OCLC sends bills to and is paid by networks. Libraries that belong to the OCLC Western Service Center are billed individually.

OCLC charges on a per-card basis for its catalog cards.

What Expenses Does a Library Incur for the Use of OCLC's Other Subsystems?

Charges for the use of the Interlibrary Loan, Acquisitions, and Serials Control Subsystems are levied on a per-transaction basis. In addition, each union list group is charged a small annual fee.

ABOUT THE EQUIPMENT

What is the Configuration of OCLC's Computer System?

OCLC has several types of computers used in different applications: on-line system, development computing, and off-line products.

On-line system

The OCLC Online System is a unique configuration of several computers connected or linked by communications equipment to form the aggregate "system". There are three functions in the system: communications, applications processing, and data-base management.

Communications: On the front end of the system, 16 Digital Computer Controls Model D116 minicomputers serve as line concentrators to over 180 2400-baud full-duplex multidrop lines. Each of these lines is capable of handling up to 25 terminals through a synchronous, polled communications protocol. The D116s are connected to an expandable Tandem system with eight processors acting as a Network Supervisor (NS). The Digital Computer Controls and Tandem computers are the communications portion of the Online System. OCLC has also implemented two Tandem communications processors as a first step toward replacing the D116s. Each of these communications processors is a multiprocessor system. The RCP (Remote Communications Processor), located in Atlanta, is a two-processor system. The LCP (Local Communications Processor), located at OCLC, is a five-processor system.

Applications processing: The NS communicates with multiple (currently six) Xerox Sigma 9 computers through a custom interface device. The Sigma 9 computers each have 256 K words (1 megabyte) of memory. These computers can be added or removed as needed by commands issued through the NS. The Sigma 9 computers perform the applications-processing function within the Online System.

Data-base management: The Sigma computers are linked to an expandable (currently 16 processors) Tandem system, acting as a Database Processor (DBP) through the same kind of interface device used for linkage to the NS (Fig. 1). The DBP has approximately 8.5 million bibliographic records available on-line from 74 300-megabyte (300 million bytes) volume sets of disc. There are also 24 million bytes of semiconductor memory in the DBP. The DBP is the data-base management portion of the Online System.

Development computers

In addition to the multivendor machine environment, OCLC has two administrative/development computers, a Sigma 9 and a Tandem processor. The 256 K-word Sigma 9 development computer is available 7 days a week. The development Sigma services remote work stations at different locations within the Center. This system is also linked to the development Tandem machine, an eight-processor system with eight 300-megabyte Ampex disc drives. The development Tandem serves double duty as an administrative/ development system and a component of the test-bed facility for the Online System.

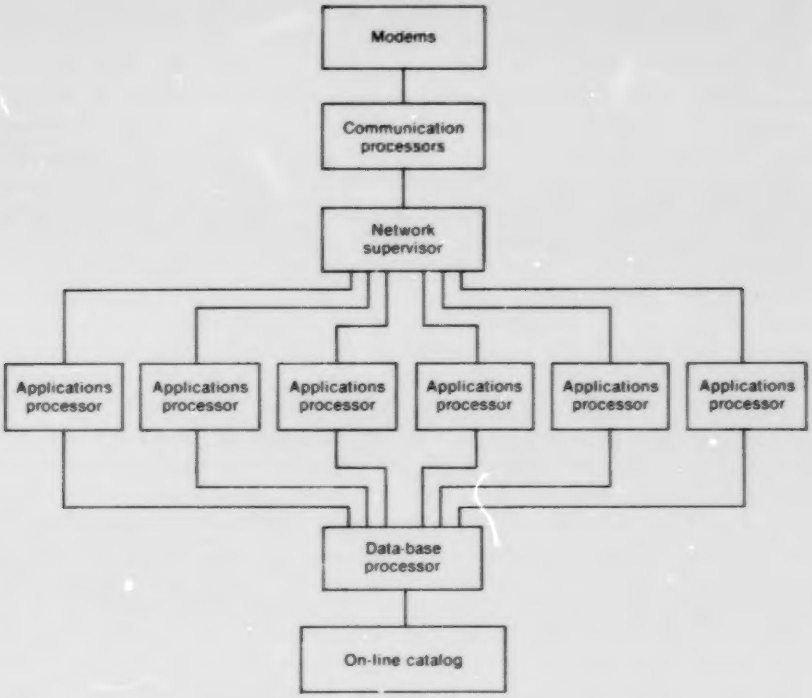
Modems
Communication processors
Network supervisor
Applications processor
Applications processor
Applications processor
Applications processor
Applications processor
Applications processor
Data-base processor
On-line catalog

Fig. 1. System architecture diagram for data-base management.

Off-line products

Two systems are used full-time to produce OCLC-MARC Subscription Service tapes, catalog cards, accessions lists, and acquisitions action forms. These systems consist of two 256 K-word Sigma 9 computers, with over 3 gigabytes (3 billion bytes) of disc storage. During the Online System's nonoperational hours, off-line production is supplemented by the development computers and the on-line computers. In addition, OCLC uses an IBM 4331 computer with seven 3302-line printers, two tape drives, and two 65-megabyte disc drives to print cards and other products. OCLC also has a Xerox 9700 laser printing system for producing internal and external products.

CUSS: AN AUTOMATED SYSTEM FOR CREATING AN INEXPENSIVE SERIAL UNION LIST

Hwa-Wei Lee

ENVIRONMENT IN ONTARIO UNIVERSITY LIBRARIES

One of the most important developments in North American library and information networks in the past decade has been an increase in resource sharing. This is certainly true of the academic libraries in Ontario. With seven new universities founded in the 1960s, it was impossible for all of them to be able to acquire the back issues of all the required periodical subscriptions. Until 1970, the procedures for determining what libraries held which titles and volumes of periodicals was very cumbersome. For the most part, libraries acted quite independently because interlibrary lending was a very time-consuming process: most faculty members, graduate students and researchers found that they had to depend on the limited resources available in most libraries rather than wait for interlibrary loans. At the same time, the universities themselves were being encouraged to cooperate whenever possible and to share resources and staff expertise.

Most libraries were also taking the first hesitant steps toward automation. The Guelph library, for example, in 1966 had a keypunch machine, and there was an early IBM 150-30 computer available on the campus for the library's use. Because the number of serials (which include periodicals) was relatively small compared to the monograph collections, Guelph, like several other academic libraries, began experimenting with machine-readable records for serials, producing simple serial lists with holdings. By 1970, many of the Ontario university libraries had these simple automated serial-listing systems operating, and found them both inexpensive and successful for their purpose.

NEED FOR A UNION LIST OF SERIALS

As mentioned previously, the universities and the government ministry that funded them expected the libraries to be able to share expensive resources: serials, other than the core discipline titles, were considered ideal for this purpose. It was felt that a library that held a particular title could easily make a photocopy of a requested article and send it quickly to the requestor at another university. This would then reduce the necessity for duplicating all periodicals at each university, allowing more unique titles to be purchased for the entire academic system in the province.

The librarians agreed with this theory but felt that it was difficult to put into practice because it was not known what serials were held in each Ontario university library. Although the ULSS provided by CISTI partially answered this problem, it was not totally adequate for three reasons:

- It pertained only to science;
- It was not updated frequently enough; and
- All libraries did not report their holdings.

Since it was felt that interlending could not be increased without more up-to-date knowledge of serial holdings, discussions began in the early 1970s about producing a union list of serials just for the Ontario university system. With at least six of the libraries already operating simple automated listing systems, it was felt that it would not be too difficult to merge the machine-readable records from the separate systems and produce one union list.

METHODOLOGY

It was agreed that the experiment should begin by attempting to merge just two libraries' files, eliminating any problems in the process, and later adding other libraries to the system, one at a time. The initial merge was accomplished by determining which data elements common to each list would be included to produce the union list, with holdings listed under each title held in common.

In this first merge, there were many duplicate entries and filing errors due to differences in the cataloging rules or formats at the different libraries. It was felt, however, that the cost of correcting this type of problem or of developing standards that would be imposed on each library was not worthwhile for the slight improvement that would result.

In 1972, with the first two libraries' files merged, four additional files were added to produce the first union list. Copies were sent to the six participants and to other libraries interested in the system for testing in their libraries.

SUCCESS OF THE FIRST LIST

After testing the list in both public reference areas and in interlibrary lending departments for several months, there was unanimous agreement that it was a successful system and that it should be expanded and continued. It was officially named CUSS (Cooperative Union Serials System). By the next merge, 8 of the 15 libraries were included in the list; and in 1982, with the ninth list, all Ontario university libraries except one included their serial holdings in the CUSS system.

INCORPORATION OF LATER USERS

With the system operating successfully, it was expanded to include the other university libraries. New participants, however, had to have their local serial records in machine-readable form. For some libraries this was not easy because they did not have automated systems or access to a computer on their own campus.

This problem was solved in the following way. The new library would choose a library already in the CUSS system and receive a print copy of that "partner" library's serial tape, with all data elements and codes. This print copy would be matched against the library's own serial collection, and a record kept of the serial identification number (SIN) of any matching titles. The complete list of matching SIN numbers would be returned to the original library, which would then create a tape of its matching titles for the new library. Using that tape, the new library then could correct holdings information, and code any unique titles in the same format as its partner library. It could arrange to either create a complete new tape for itself or send it to the partner library to do it for them. With the tape created, the library was able to not only contribute to the CUSS union list, but also create its own in-house catalogs, listings, etc. Because the files were small, the partner libraries charged little if anything for this helpful assistance.

In this way, all the libraries gradually added their files to the CUSS system at minimum cost.

PROBLEMS AND BENEFITS OF A SIMPLE SYSTEM

It should be realized that CUSS remains what is called a "quick and dirty" system. It is a machine merger of the serial files of 15 different institutions with almost 15 different coding systems and several different cataloging practices. The files are converted to a common format but the inconsistencies within any file and between files are not eliminated. Because of these inconsistencies, many titles do not match and therefore are listed two or more times.

There are no real standards for the system - only a few simple rules. One of these is that initial articles (e.g., **The** Journal of American Physics) should be deleted from the CUSS format. This is usually done by a sequence number or indicator that is used for filing purposes.

As a result of the system's simplicity and the differences among the individual libraries, errors creep into the merged union list from time to time. For example, lack of an indicator for articles frequently results in pages of one library's entries under "the". The list is rerun if the errors are too numerous, but a few articles or duplicate entries are considered acceptable and do not detract from the value of the list.

One of the problems of the CUSS list is that staff members who do not realize that its main purpose is cost-effectiveness attempt to eliminate the errors and to introduce standards. Some libraries have in fact converted their own serial files to MARC format (for serials). Some participants have recommended that all librarians in the CUSS system should be forced to convert to MARC format, and that a proper reference structure be added to the system as well.

Fortunately, the simple format and lack of standardization was maintained, in accordance with the wishes of those libraries that felt that a simple structure was sufficient for the purpose of a union list with a limited size (81,000 total records in 1982). A program was written for converting MARC records to the CUSS format to accommodate libraries wishing to use a more sophisticated serials system internally. Reference records that have been added by individual libraries to facilitate the use of their local serials systems have been included in the union list as well.

NEW USES FOR THE SYSTEM

The CUSS list is used extensively in the university library system to assist staff and users to determine the location of journals, periodicals, or serials not held in their own library. Originally, the main access for those other resources was through interlibrary loans. The lists are now produced on COM/fiche and several copies are displayed (with microfiche readers) in all reference source areas of the participating libraries, so that locating a needed title is not a time-consuming part of the interlibrary loan routine. In fact, if the CUSS list is given as the location identifier, no further verification (as officially required by interlibrary lending agreements in North America) would be needed. This has greatly reduced the cost of interlibrary lending among the Ontario university libraries.

A further use is that of reciprocal borrowing. With the union lists (of serials and documents) available in each library, there was an increase of lending material between libraries in the system. It was therefore less demanding of staff time as well as faster for the library user for the user to travel directly to the library that held a desired title and borrow it there. Accordingly, a special interuniversity borrowing system was developed to allow students and faculty from one institution to borrow or make a photocopy at another: they can be sure that the desired title is there because they have found its location on the CUSS list. With many institutions less than 50 miles from each other, direct resource sharing has become an effective service.

One further use of the CUSS system should be mentioned - resource rationalization. Several libraries in close proximity have agreed to not purchase certain serial titles if another library has those titles and displays them in the CUSS list. Faculty members accept this arrangement as long as they know which titles are where. In this way, Ontario university libraries have been able to concentrate serial holdings and selection in specified libraries according to their institution's academic programs, minimizing less essential or less appropriate titles. For example, one university will concentrate on biophysics, while another will buy inorganic chemistry, because those are the emphases of their individual universities. Because there is less duplication involved in sharing collections through the CUSS list, the total resource of the Ontario university library system is increased.

INFORMATION SOURCES

SURVEYS OF USER NEEDS

J.B. Wills

Some surveys are undertaken as academic studies for research purposes. Others are undertaken for fact-finding, prescriptive purposes. We will concern ourselves solely with the latter - surveys that assess user needs so that information centre managers can increase user satisfaction.

WHY SURVEYS ARE NECESSARY

Most users accept the formal information services available to them as they are. If these services are deficient, however, most users will seek other ways to obtain the information they need. Two basic information systems therefore exist side by side: formal systems (i.e., libraries, information bureaux, commercial data bases) and informal systems (i.e., exchanges of information directly between people who share the same interests).

Managers of formal information centres may be unaware of deficiencies in their services unless user surveys are undertaken because users tend to:

- Use formal systems if they are convenient (i.e., in the same building or institute, or reachable by mail);

- Use informal systems if formal systems are not conveniently available, or as a supplement to formal systems; and

- Manage as best they can without consulting any information system.

LIMITATIONS OF SURVEYS

Most users value their freedom to choose whichever information system is best for a particular enquiry. They rarely expect any one formal system to provide all the information they need. User surveys organized by managers of formal information centres therefore cannot expect to obtain a complete picture of user needs. What information is obtained, however, is of maximum validity if both quantitative and qualitative data are obtained.

FINDINGS OF PREVIOUS SURVEYS

Based on data provided by biological and physical sciences graduates working in research and development organizations, both primary and secondary user needs were assessed.

Primary Needs

Information should be available quickly when needed. As a new need for information arises, users expect to get the information from formal or semiformal systems within hours, days or weeks, depending on the urgency of their request.

Sources of information, such as libraries or computer terminals, should preferably be in the same building as the user. For information expected to be readily available, users will invest up to 1 hour of travel and search time. More time than that will be spent only in particularly important circumstances.

Information should be fully up to date. Although normally only information from recent literature (up to about 5 years) is required, there should be facilities to obtain previous information.

Information should be presented in such a way that relevant data are readily identifiable. Users expect information staff to exclude irrelevant data from information provided in response to an enquiry.

Photocopying services should be available. Users do not want to have to take full notes in a library or in front of a computer terminal, but prefer to take away copies of key documents for their own use.

Similarly, when users consult documents in a library, they expect to be able to borrow them for a period of about 2-4 weeks. They also expect the librarian to borrow documents they need from other libraries if necessary.

Shelf and cabinet arrangements for stocks in a library should be simply laid out and logically labeled. Users normally appreciate guidance from library staff but expect to be able to find the literature they require by themselves. (Browsing of course cannot be effective if the literature is hard to find.)

Secondary Needs

Current awareness - perhaps surprisingly - is a secondary need because most professional users already have some sort of current awareness system of their own in operation. (Keeping up to date is normally a routine part of professional activities.) "Reinforcing" current awareness information received from formal information systems is regarded as useful rather than essential.

Selective Dissemination of Information (SDI) is similarly regarded as useful rather than essential for the same reason. However, consistently good quality current awareness or SDI services become essential services because users come to rely on them. (Evidence of such reliance would assure an information centre manager that, at least in this aspect of his/her work, user satisfaction was being achieved.)

SURVEY OF USER NEEDS FOR MANAGERS OF INFORMATION CENTRES

Experience suggests that the most reliable way to obtain information about user needs is to conduct a survey by distributing a questionnaire.

Essential facts (e.g., the number of books borrowed, photocopies requested, enquiries made) expressed in a quantitative survey rarely provide adequate information: they reveal trends in user behaviour rather than specific needs. Qualitative surveys, however, if undertaken at a suitable time in an information centre's development and then repeated in shortened form at intervals of, say, 2 years, are much more useful: they can reveal users' needs in such a way that the manager can decide how best to reallocate resources to improve services. It is suggested that the following steps be taken in conducting a qualitative survey.

- Compose a questionnaire, grouping related questions together in subject categories. Make sure that the questions asked will provide the data required. Prepare a draft for internal discussion among information staff to permit the maximum amount of constructive criticism. Frame each question so that the response may be indicated over a scale of 5, for example, from Very important (1) to Unimportant (5). Ask any six respondents to comment on the draft: two at the senior level, two at the middle level, and two at the junior level. Revise the questionnaire in light of their comments.

- Send the questionnaire to at least 20% of the user population - up to 30% if the user population is less than 200.

- Hold a discussion for 10 senior-level representatives of the user population who did not complete questionnaires. Ask for comments on user needs, follow the questionnaire subject categories, and tape-record the discussion so that unanimous comments can be identified later on.

- Hold a similar discussion for 15 middle- and junior-level representatives of the user population who did not complete the questionnaire, and similarly identify unanimous comments.

- Evaluate the responses to the questionnaire, and interview as many respondents as possible whose responses were markedly different from the norm. Take note of individual or small-group needs that may require special attention in the services provided.

- Send a second copy of the same questionnaire to all respondents, indicating what the majority response has been to each question, and asking the respondents how they would now respond to each question. At the end of each section, provide a few lines for comment.

- Statistically analyze the second questionnaire. State the first-, second- and third-order priority needs expressed by respondents, and identify from written and spoken comments what additional services are of lower priority.

- Determine what action is financially and managerially possible and, in conjunction with administrative and finance staff, what degree of implementation is permissible. Work out ways of implementing new action. Initiate ways of monitoring user satisfaction by recording user data (e.g., loans, photocopies issued, enquiries handled), and by repeating shortened versions of the questionnaire at about 2-year intervals, modifying the questions in the light of new trends in user needs.

MANAGEMENT TECHNIQUES: OPERATIONAL EXAMPLES

J.B. Wills

OPERATIONAL PLANNING

Good planning requires precise analysis of the operations of an information centre. Although time-consuming, it is helpful to create a critical path diagram, or network analysis, of all major operations. [Network analysis of a typical production activity was depicted for a sample report.]

Network analysis diagraming was used to express the main elements as follows:

- Defined activities (indicated by a line with an identification number),
- A box stating the time taken to complete each activity (in this case, in days), and
- Broken lines showing what activities have to be completed before others can begin.

A flow chart was produced because it is a recommended procedure for particular activities of this nature. It should be numbered.

Examples of the steps to be taken in a computer-based information centre to scan literature, acquire documents, index them, and prepare input documents are shown in Fig. 1.

Timing of Tasks

When the sequence of tasks is recorded in this way, their performance time needs to be checked. Experience shows that staff can state a checkable

START 1
1 Scan for selection
5 Check for duplication
6 Write acquisition request

START 2

14 Locally acquired material
18 Write in-put document (2 copies: numbers 2 & 3 only)
13 To centre
15 Acquire external material
19 Write in-put document (3 copies: retain copy number 1)
23 Material
24 In-put documents (copies number 2 and 3)

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28 To scanners 3
30 Index? [YES or NO]
31 Add index terms to input documents
33 Material 1.36
34 Input document (copy number 2) 1.33
35 Input document (copy number 3): retain for checking
END

Fig. 1. Examples of steps in flow charting.

average time for any one task, e.g., 2 minutes for "check for duplication". The only satisfactory way of assessing the overall time, however, is to find out how many operations are completed in a week or a month. The time actually taken for any one task may be up to double the average assessed on the job.

Matching Tasks to Staff

The next step is to check if the tasks are currently being (or will be) performed by staff at the appropriate level. Tasks that involve two or more members of staff should be operationally well organized.

In collaborative discussion, the time of all staff involved should be used to maximum advantage.

Allocating Staff Functions

Table 1 shows the allocation of staff functions at different levels of seniority in a computer-based information centre. The data are expressed in staff time where 1 staff member = 1.00. The objective in drawing up such a table is to ensure the best use of staff time in all activities.

Table 1. Allocating staff functions.

Function	Manager	Level 2	Level 3	Level 4	Level 5	Photoprinter
Acquisitions			0.45	0.25	1.95	
Periodicals control				0.55	2.20	
Payment processes			0.05	0.05	0.25	
Cataloging		0.10	0.10	0.85	0.25	
Classifying				0.45	0.15	
Scanning/ selection			2.00	0.50		
Indexing		0.05	0.15	1.80		
Recurrent bibliographies		0.05		0.40		
Auxiliary library duties			0.10	0.35	2.45	1.00
Abstracting		0.05	2.00			
Loans			0.05	0.15	3.00	
Current awareness		0.05	0.10			
SDI			0.05	0.40	0.35	
Enquiries			0.60	1.15	1.35	
Document production		0.05				
Management	1.00	0.60	0.30			
Translation, etc.		0.05	0.05	0.10	1.45	
Computer operations			1.00		1.60	
Total	1.00	1.00	7.00	7.00	15.00	1.00

The advantages of such an allocation of staff functions are as follows:

- It helps the manager to clarify functions with precision in discussion with staff;
- It helps the staff to understand the relationship of their functions with those of others;
- It informs the staff about the lines of management from senior to junior levels; and
- It facilitates the use of "Management by Objectives".

MANAGEMENT BY OBJECTIVES

The stages of management - organization, motivation, and control - should follow the stages of planning. The recommended way of achieving these is through Management by Objectives.

Targets should be discussed with individual staff and groups of staff; realistic objectives should be agreed upon within the overall plan. Similarly, ways of controlling quantity should be decided upon (e.g., the number of photocopies produced per month), as should ways of controlling quality (e.g., the number of hits and misses in information retrieval).

CHINESE INPUT/OUTPUT AND PROCESSING

T.C. Ting

Computerization of information in China faces a practical problem, that is, Chinese character processing which involves input, output, sequencing, searching, storage, and transmission of Chinese characters. However, the most obvious problem is the input. The difficulties of doing research in this area in the Western world are two-fold: financial and technical.

Even though Chinese characters pose a problem, it is not a major problem in the Western world. The information collection in Chinese constitutes only a very small percentage of total collcction. Funding agencies and foundations are not really putting much money into sponsoring this type of research. Computer vendors feel there is a market potential, but the actual market is hard to predict.

Basic analytical data on Chinese language is lacking. Also, although there are as many as 50 or 60 proposals, both in the West and in China, for solving Chinese input problems, most of these proposals are from isolated individuals with a shallow approach that takes little or no advantage of computing technology.

The following suggests the various directions for research.

CLASSIFICATION OF EXISTING CHINESE INPUT METHODS

Existing methods may be distinguished as Coding methods (Telegraphic, Four-corner, Three-corner, and Head and Tail); Whole character input method; Morphological methods (Subcharacters, Subdividing characters by topographical features, and Using the stroke as foundation for developing a pseudo-Chinese alphabet); Phonetic methods (using the traditional Chinese phonetic symbols and the Pinyin method); Combination of the patterns and phonetic methods; and Using the interactive computer techniques with Interactive selection based on the phonetic approach or on subcharacters.

CHINESE OUTPUT METHODS

Output methods may be described as: DOT matrix (printer or terminal); Graphic generation with graphic terminals or X-Y plotter and other hardcopy devices; Optic fibre printers; and Electrostatic printer.

BASIC RESEARCH

Basic research is needed in three aspects of information processing in Chinese: linguistics, computing technology, and human factors.

Linguistics

Frequency analyses of various aspects of written Chinese are needed: Chinese character distributions of various subject categories; and frequency distributions of subcharacters and of strokes and stroke order. Also, several other studies are needed: the structure of Chinese characters; analysis of Chinese words, vocabularies, and phrases; development of a better Chinese grammar; improvement of the organization of Chinese dictionary for automation; and detailed analysis of the Chinese phonetic systems, including frequency analysis of pronunciation including that for various dialects.

Computing Technology

In computing technology, research is needed on optimizing storage, sorting and search, and typesetting applications of Chinese; the use of functional keys; graphic input; voice recognition and audio output; message transmission as fixed or variable code or for commonly used words and compound words and phrases; and computational linguistics.

Human Factor Studies

Human factor studies include: the study of common practices in terms of Chinese data collection and information utilization; relationships to various proposed computer terminals; and economic analysis.

IMPROVING BIBLIOGRAPHIC CONTROL FROM THE NATIONAL PERSPECTIVE

Hwa-Wei Lee

BIBLIOGRAPHY - OBJECT, PURPOSE, TECHNIQUES, AND FORM

The word "bibliography" derives from the Greek biblios (book) and graphos (to write), and originally denoted the transcribing of books. Bibliography has its own object, purpose, techniques, and forms (Mikhailov and Giljarevskij n.d.).

- The object of bibliography comprises written works duplicated by some means and intended for a wide cross-section of contemporary and future readers.
- An immediate purpose of bibliography is to encourage the dissemination of printed, written records.
- The techniques of bibliography include tracing and recording written works, selecting them according to certain criteria, describing them (sometimes supplemented with a critical appraisal), and classifying them.
- The forms of bibliography are listings and literature surveys.

The term "bibliography" also applies to the discipline dealing with the elaboration of theory, methodology, and history of bibliography as a special field of knowledge or study.

MAJOR TYPES OF BIBLIOGRAPHIES

Depending on the content and kinds of materials listed, bibliographies may be general or special:

- General bibliography lists materials irrespective of their content and kind, and

- Special bibliography covers only publications in a particular subject area or of a particular kind.

Depending on the purpose, bibliographies can be enumerative, scientific, or recommendatory:

- Enumerative or recording bibliography registers, as exhaustively as possible, materials in different fields of knowledge or of specific natures;

- Scientific bibliography aims to inform specialists of the publications in their field of interest; and

- Recommendatory bibliography provides reading guidance and helps certain readers to choose appropriate literature.

Depending on the date of publication, bibliographies are either current, retrospective, or prospective:

- Current bibliography records materials as they are published;

- Retrospective bibliography covers a certain period before the time of compilation of the bibliography; and

- Prospective bibliography reflects publications that are in press.

Depending on the place of publication of the literature registered, bibliographies may be international, national or regional:

- International bibliography lists materials in different languages published in different countries;

- National bibliography covers materials published in a certain country or in a particular language; and

- Regional or local bibliography records publications issued within a particular region or district.

Depending on the method of arranging the entries, bibliographies as well as catalogs may be either classified, subject, or author:

- Classified bibliography arranges materials according to a classification scheme or order;
- Subject bibliography arranges entries by subject; and
- Author bibliography arranges listings by author.

The types of bibliographies mentioned above are not exhaustive, but are meant to give a general idea of the multiplicity of bibliographies available.

BIBLIOGRAPHIC CONTROL FROM NATIONAL AND INTERNATIONAL PERSPECTIVES

According to the 1964 syllabus for professional examinations published by the British Library Association, bibliographic control is "the development and maintenance of a system of adequate recording of all forms of materials published and unpublished, printed, audiovisual or otherwise, which add to the sum of human knowledge and information" (Davison 1981).

Bibliographic Control and National Bibliographies

Attempts at bibliographic control existed in China long before many other countries. With the invention of modern printing technology and the proliferation of printed materials, the need for improved bibliographic control of the recorded knowledge became increasingly apparent, both from national as well as international standpoints. Basic to national bibliographic control is the production of a national imprint. The decolonization after the Second World War encouraged the many newly emerged nations to compile and publish their own national bibliographies as a way of manifesting their cultural identity and national self-consciousness. The growth of vernacular literature in these countries also contributed to this development. Recent surveys conducted by UNESCO indicated a drastic increase in the number of national bibliographies from 53 in 1953 to 194 in 1974 (Beaudiquez 1977).

University Bibliographic Control (UBC)

The growth of national bibliographies created the need for international cooperation in standardizing the coverage and contents of bibliographic records to facilitate the international exchange of bibliographic information. The establishment in 1974 of an international office for UBC under the auspices of the International Federation of Library Associations and Institutions (IFLA) was a direct response to this need.

It was stated that "the concept of UBC - a long-term programme for the development of a world-wide system for the control and exchange of bibliographical information - presupposes the creation of a network made up of component national parts, each of which covers a wide range of publishing and library activities, all integrated at the international level to form the total system" (Anderson 1974).

The International Congress on National Bibliographies

Aims of the International Congress

In an attempt to further the concept and ideal of UBC, UNESCO and IFLA collaborated on a major International Congress on National Bibliographies in Paris, 12-15 September 1977. Its aims were:

- To reach agreement on minimum standards and acceptable practices for the coverage, content and form of national bibliographic records, taking into account the requirements for international exchange;

- To reach agreement on acceptable guidelines for the presentation, arrangement and frequency of the printed national bibliography; and

- To discuss and make proposals for the sharing of resources to assist countries in achieving national bibliographic control, using either manual or computerized methods of producing national bibliographies.

Recommendations of the International Congress

The complete set of 23 recommendations adopted by the Congress is included in Guidelines for the National Bibliographic Agency and National Bibliography (UNESCO 1979). Below is a summary of the major recommendations.

Legal deposit: Recommendations 1-4 specified a review of existing deposit legislation regarding how it conforms to the current needs of the national bibliographic control, and recommended that legislation be revised where necessary.

Selection of materials for the national bibliography: Recommendations 5-7 stipulated that the national bibliography should minimally include all monographs published in the country and first issues of serials (and title changes), including official publications; it should also widen its scope to register other categories of documents as soon as possible. Furthermore, the national bibliography should reflect national imprints in all languages and scripts in use in the country.

Presentation and frequency of the national bibliography: Recommendations 8-11 stated that printed issues should appear at least quarterly, with a cumulation at the very least annually. Each issue should be printed on A-4 size paper, with a clear layout of the typography of the cover or title page, indicating the exact title of the given publication, the period covered, place and date of publication, etc. The publication should have an introduction in each quarterly issue at least, a main body of text together with subsidiary indexes.

Catalog cards: Recommendation 12 proposed that there be a study of the issuing of catalog cards by national bibliographic agencies and of their use in the international exchange of information; it also recommended a study of the desirability of establishing an international standard for the physical form of the card.

Contents of the bibliographic record: Recommendations 13-15 and 20 stipulated that the national bibliographic agency, in accordance with the aims of UBC, should prepare comprehensive bibliographic records of its national imprints, and in so doing incorporate international cataloging principles and bibliographic standards, in particular the International Standard Bibliographic Descriptions (ISBDs) and international identification systems such as ISSN and ISBN.

CATALOGING-IN-PUBLICATION

The implementation of a "Cataloging-in-publication" program, which has been tested with considerable success in the USA and some other countries, is an effective way to facilitate bibliographic control and to standardize cataloging practice. To provide full cataloging information in a publication, the publication must be cataloged before printing or production. This cataloging information will save a great deal of time and cost in subsequent cataloging by libraries and information centres and will make the publication more easily available.

BIBLIOGRAPHIC CONTROL AND NATIONAL BIBLIOGRAPHY IN CHINA

This part of the lecture will be devoted to a discussion and review of the current situation in China regarding bibliographic control and national bibliography in the light of the above recommendations. The general topics to be discussed include:

- The administration of the national bibliography,
- Legal deposit laws and related matters,
- Selection of materials for inclusion in the national bibliography,
- Arrangement and presentation of the national bibliography,
- Contents of the bibliographic record, and
- The future of the national bibliography in China.

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INFORMATION SERVICES

COST-EFFECTIVENESS AND COST-RECOVERY IN INFORMATION SERVICE

Hwa-Wei Lee

COST-EFFECTIVENESS[1]

Definition

"Effectiveness" is a measure of how well a system is meeting its objectives or how well it is satisfying the demands placed upon it. "Cost-effectiveness" is a measure of how efficiently it is satisfying its objectives in terms of costs. "Cost-benefit" is a measure of the system's worth or whether the system justifies its existence.

Cost-effectiveness and cost-benefit may be differentiated as follows:

- Cost-effectiveness deals with the relationship between level of performance (effectiveness) and the costs involved in achieving this level.
- Cost-benefit refers to the relationship between the benefits of a particular product or service and the costs of providing it.

The expression "cost-performance-benefits" relates to the entire interrelationship between costs, performance (level of effectiveness) and benefits.

Historical Development

The evaluation of the performance of information service has gone through several phases in the past 30 years.

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[1] See Lancaster (1971).

In its initial phase, evaluation was primarily concerned with the comparison of indexing languages and the effects of these languages on search performance. Much of the evaluation research at that time was done in a laboratory-like setting, concentrating on a series of carefully performed experiments on a nonoperational file of documents (e.g., Cleverdon 1962). Out of this effort came the first measure of system performance, such as "recall" and "precision", which are based on the relevance of retrieved documents.

In the second phase in the late 1960s, evaluation began to shift from nonoperational systems to operational systems. Probably one of the better known examples was Lancaster's evaluation of the MEDLARS system (e.g., Lancaster 1968).

In the third phase, evaluation was directed more toward operational decisions. It was recognized that evaluation is not an end in itself but rather arises out of a need to set a value on a system. This line of thinking led to emphasis on evaluating the cost, effectiveness and benefits of systems (e.g., King and Bryant 1971).

Since 1970, the kind of systems evaluated, as well as the methods of evaluation, have changed dramatically. Emphasis was much more on the operation of library systems, networks of libraries, and networks of information systems.

Measurement of Cost-Effectiveness

The cost of an information service can be measured in terms of input of resources (i.e., funds). There are three types of costs:

- Fixed costs refer to outlays that remain constant, regardless of the quantity of output (e.g., equipment purchase or rental, developmental costs).

- Variable costs refer to outlays that vary with the amount of business done or the volume of goods produced. They vary with the number of transactions (e.g., the overhead charge for each search varies by the total number of searches conducted). They also vary with different modes of operating the system (e.g., the mode of interaction with the user or with the data base).

- Marginal costs refer to the addition to total cost resulting from the addition of the last unit of output (e.g., the additional cost incurred by an SDI service when it adds one more profile to run on a particular data base).

A system's performance is measured according to:

- Its coverage;
- Its ability to retrieve wanted items (recall);
- Its ability to avoid retrieval of unwanted items (precision);
- Its response time; and
- The amount of effort required by the user.

A system's benefits are measured according to the following criteria:

- Cost savings in using the system, as compared with the costs of finding needed information elsewhere;
- Avoidance of the loss of productivity that would result if information sources were not readily available;
- Improved decision-making or reduction in the level of personnel required to make decisions;
- Avoidance of engineering or research effort that has either been done before or that has been proved unfeasible by earlier investigators; and
- Stimulation of invention, which is a serendipity factor (for example, an industrial current awareness service might easily justify itself economically by suggesting possible new products or new applications for existing products).

Cost-Effectiveness Analysis

A cost-effectiveness analysis seeks to increase the value received (effectiveness) for the resources expended (cost).

There are two possible ways to improve the cost-effectiveness of an information system:

- Maintain the present performance level (recall, precision, response time, etc.), while reducing the costs of operating the system; or
- Hold operating costs constant while raising the average performance level.

Five basic steps are involved in a cost-effectiveness analysis:

- Define the objectives that must be attained;
- Identify alternative methods of meeting these objectives;
- Determine the costs of these various alternatives;
- Establish one or more models that relate the costs of each alternative to an assessment of the extent to which each could assist in achieving the objectives - the model used may take the form of mathematical equations, a computer program, or merely a complete verbal description of the situation; and
- Establish a criterion for ranking the alternatives in order of desirability and choosing the most promising - the criterion provides a method of weighing estimated costs against estimated effectiveness.

Performance degradation can occur at any of these stages, and the degradation effects are cumulative. For example, a poor request statement may in itself eliminate 20% of the items in the data base that are relevant to the user's information requirements. Vocabulary limitations may prevent retrieval of another 10% of the useful items, 15% are eliminated by an inadequate search strategy, 5% by indexing error or inadequacy, and 5% by the postsearch screening operation. As a result, the ultimate recall is only 45%. These figures are hypothetical but they are by no means atypical. The cumulative degradation effect prevents us from achieving 100% recall at 100% precision over any significant number of searches; and it effectively prevents us from designing a system that will operate anywhere close to this ideal performance level.

Trade-offs in information systems

We have seen the various stages involved in information retrieval and the factors affecting the success and failure of each stage. All of these stages are susceptible to cost-effectiveness analysis. It should be obvious that there are many possible ways of operating an information system so that it will produce acceptable results (e.g., retrospective searches that yield an acceptable recall at a tolerable precision to the end-user). In other words, there are a number of possible trade-offs between various processes (e.g., indexing and vocabulary effort versus search effort, or search strategy effort versus screening effort). A cost-effectiveness analysis of a complete system will compare these possible trade-offs and determine which is the most efficient combination of procedures for obtaining a particular level of performance - that is, which combination is most effective in relation to the cost variables.

Table 1 presents a trade-off comparison of two hypothetical information systems.

In System A, great care and expense is put into the operation, resulting in economy in output efforts and costs. In System B, on the other hand, deliberate policies designed to economize on input costs are in effect, with the inevitable result that output effort and costs are increased. System A is not necessarily more efficient than System B, and vice versa. The approach taken in System B may be more cost-effective than the approach taken in System A if it achieves an acceptable level of performance for the end-user at an overall cost less than that of System A.

Table 1. Trade-off comparison of two hypothetical information systems.

System A	System B
Input characteristics	
A large, carefully controlled vocabulary	A small controlled vocabulary supplemented by the free use of keywords
Indexing of medium exhaustivity (an average of 10 terms per document)	Low exhaustivity of indexing (5 terms per document)
Highly trained indexers at a high salary level	Less highly trained indexers without college degrees
An indexing revision process	No indexing revision
Average indexer productivity of 40 items per day	Average indexer productivity of 100-125 items per day
High input costs	Low input costs
Relatively long delay between publication and actual input to system	Fast throughput

Table 1 continued.

System A	System B
Output characteristics	
Reduced burden on the searcher in preparation of strategies	Greater burden on the searcher in preparation of strategies
High precision of raw output	Low precision of raw output
Tolerable recall	Tolerable recall
No screening needed	Screening of raw output needed to raise precision to tolerable level for end-user
Fast response time	Delayed response
Relatively low search costs	Relatively high search costs

Other factors enter into the decision as to whether to put emphasis on the input processes or the output processes of an information system:

- Volume, including both the number of documents indexed and the number of requests processed in a given period;
- Required input speed (e.g., needed for current awareness);
- Required output speed (e.g., in the case of a poison information centre); and
- By-products.

Regarding the cost-effectiveness of hardware, important factors to consider are:

- Optimum production capacity of the equipment,
- Maintenance record,
- Turnaround time,
- Estimated volume of work to be handled, and
- Purchase or leasing costs.

COST RECOVERY[2]

Justification for Cost Recovery

The pressures of limited budgets and increased competition for use of funds are forcing information centres and libraries to initiate user fees. There have been pros and cons in regard to such charges. A strong argument for charging user fees to recover part or all of the cost is that, without such fees, some of the information services may not be available at all. Furthermore, user fees (particularly partial fees) prevent possible abuse by those who make use of a service simply because it is free, not because it is needed. Such abuse may drain limited financial resources and may consequently cause the information service to be curtailed.

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[2] See Zais (1977).

Before making pricing decisions, one must consider the institution's mission and goals, from which derive specific pricing objectives. In traditional literature, management's overall pricing objective is assumed to be profit maximization. Traditional library and information service goals have been to minimize costs, to limit losses to a budgeted amount, and to maintain standards of service. In recent years, however, there has been a growing opinion that information services should pay for themselves. Pricing objectives now include the recovery of operating costs or total costs. Based on a survey conducted by Zais, 13 of the 15 SDI centres responding gave cost recovery as their primary objective in charging. These centres had varying degrees of self-sufficiency as their goal, ranging from recovering only a portion of operating costs to becoming financially self-sustaining and even net-revenue-producing.

Pricing Practices

There are three common pricing practices:

- Cost-based pricing means that price is set largely or totally on the basis of the cost. Common cost-oriented pricing practices include markup, cost-plus, and target rate of return pricing, i.e., price is determined by adding some fixed percentage to the unit cost of production.

- Demand-based pricing means that the intensity of demand for a product or service is taken into consideration in pricing. Lower prices are charged when or where demand is weak and higher prices are charged when or where demand is intense. Price discrimination is one of the common forms of demand-based pricing.

- Competition-based pricing means that the price is based on what other producers of the same product or service are charging. "Going rate" or "imitative" pricing is a popular technique that is competition oriented.

Pricing Techniques

Three basic pricing strategies may prove appropriate to information service and product pricing:

- Average-cost pricing, which includes both fixed and variable costs and is a relatively simple pricing scheme to administer;
- Price discrimination involves varying the price according to set criteria but it is difficult to administer (examples are airlines' special discounts, off-season rates of various kinds, etc.); and
- Marginal-cost pricing, in which the price is more constant and is lower than average cost, and which does not recover the full cost of an information service.

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INFORMATION SOURCES

K.P. Broadbent

The most important and basic task for information officers is identifying sources of information in a given field in order to give a rapid and accurate response to enquiries. Each information centre covers different specialized topics but must also handle a lot of general information. To access such information, the centre needs to have a good range of reference tools, many of which will be in printed form.

REFERENCE MATERIALS

The first type of publication one usually consults to answer enquiries is a reference work in the specific field. A reference work is not intended to be read cover to cover, but to be used mainly to extract short, specific items of information. A reference work is characterized by the fact that it is comprehensive within its subject scope; it is usually brief in its treatment of the subject matter; and the information is easily obtained by rapid scanning of its contents. Examples of this kind of reference work include dictionaries of all kinds, glossaries, and directories of research institutions, research work or workers. Not all such reference works can be entirely relied upon to provide the type and range of information that an information centre has during the course of its operation.

General

There are several factors to be considered when consulting reference works:

- The current value of the information: There is usually a lag between the time the information was gathered and when it actually gets published. This may mean that the information is inaccurate, particularly in directories of research workers who transfer or change their jobs frequently.

- The accuracy of the contents: This has to be evaluated according to the original sources used. For instance, did the publisher circulate a copy or the manuscript to the right institutions, societies, etc.?
- The scope of the information: This should be considered in terms of the material covered. For instance, a dictionary of agricultural terminology compiled by agricultural scientists may be considered accurate only if it does not stray into too many related areas, such as geography or anthropology.
- The authority of the information: This is determined according to the reputation of the editors and publishers. Many directories have been available for many years and are respected by their readers all over the world.
- The objectivity of the publication: It is necessary to consider whether the work has any particular bias, whether the content is impartial.

Bibliographies

The next category of reference publications comprises indexes, bibliographies, and abstracts. Some of the many examples include the Bibliography of Agriculture, Agrindex, Pollution Abstracts, Biological Abstracts, and Index Medicus.

A regular bibliographic service similar to the ones mentioned above is more useful than an individual bibliography or a special bibliography, which has limited value without constant updating. Individual bibliographies tell us what has been done, whereas the regular bibliographic service tells us what is being done now.

There are two types of bibliography: indexes to the key literature on a subject, which list titles and provide all the data necessary to identify a document; and annotated bibliographies, which in addition provide a short abstract on the subject of the document to give the reader some idea of its contents.

The same criteria should be applied to bibliographies and indexes as were applied to reference works. There are a number of additional points, however, that need to be borne in mind when selecting sources of information from bibliographies:

- Selection of documents is important - it is the first responsibility of the compiler to ensure bibliographic control of the parent organization and country on the basis of UNISIST guidelines;

- The bibliography should preferably follow UNISIST standards to assist retrieval and compatibility; and

- All documents listed should be obtainable as it is very frustrating for readers of bibliographies to find that the main papers they want in the listing are not available.

In a library, the main sources of information are catalogs and other internal records. They are quick reference guides that give the searcher an overview of the library's actual holdings. Union lists also provide additional individual listings or cooperative listings to assist readers in obtaining journals, books, etc., that are not in their own library but in a related one.

In many countries, however, union lists are not commonly compiled, simply because of the lack of trained librarians or of money at the national level. Libraries, too, are often poorly organized, making cooperation difficult. Most libraries and information centres attempt to describe their holdings in some way - by acquisition lists for current awareness, periodical holdings, catalogs or guides.

Acquisition lists are of use to many groups of researchers. They are usually mimeographed and found on prominent display in any library, such as on the card catalog, because it is a basic reference tool. Large holdings lists should be divided alphabetically by author, subject, and geographic ordering. They are updated regularly and, in the same way as the current bibliographic services, tell us what is being done and what is new.

A library guide, which provides instruction on the use of the library, may be a simple information sheet or a large book, depending on the size of the institution. It records the nature and size of the collections, their subject coverage, layout, classification and organization, as well as routine administrative details, such as library rules and opening hours.

Modern libraries in North America and Europe now place more and more reliance on mechanized methods of recording information. The growing volume of literature, coupled with the increasing costs of publishing in the traditional form, has given rise to the use of computers to record, store and retrieve literature.

As was stated earlier in this lecture, an important consideration in evaluating a source of information is its current value (i.e., the speed with which it was recorded). Because it takes a lot of effort and expense to update any list pertaining to new publications, the most satisfactory way to provide up-to-date service is to use computers. Not only are catalogs now compiled by computer, but the main bibliographic services are now organized the same way.

When we record bibliographic material of any kind on a computer, we call it a data base. Data bases may be general like MARC (Library of Congress System), which is the library catalog on magnetic tape, or specific like BIOSIS, which is a tape version of the biosciences information update of the printed version of Biological Abstracts.

Audiovisuals

We can now move on to look at other sources of information that are often overlooked, although they may be equally important, depending on the type of request. First there are films. These have been growing in importance as an information source since the invention of motion pictures. A lot of vital information can be recorded more effectively on film than by any other means (e.g., evidence of crop failure, up-to-date news accounts of a country or region, or close-up impressions of a work process). A main source of information for soil scientists, foresters and geologists is aerial photographs, slides and maps. A well-organized map library is often hard to find in many parts of the world, yet maps are a basic research tool for some scientists and workers. A whole range of miscellaneous sources of information should also be considered: brochures, fact sheets, trade literature, press releases, biographies, and year books.

How are documents identified? The basic method must be through printed texts. Internally, these consist of reports, general correspondence, statistics and other numerical data, as well as notes of all kinds.

We should point out now an important distinction between material that is available easily in published form ("conventional literature") and the vast body of material that is not published in the traditional sense, is limited in quantity and not easily available ("nonconventional literature").

Within an institution, a lot of documents that are produced in the course of one's work will fall into the category of nonconventional literature. It is the responsibility of the librarian, information officer, or some designated person to record and exercise control of this literature to improve information exchange.

External sources of information, although extremely useful, should not be identified until internal resources have been thoroughly searched. In this respect, individual scientists or workers should not be forgotten: they may have a lot of valuable information in their heads, or know of someone who can help, or have recently read a text or seen a thesis that has bearing on the subject.

Very often a member of one's own organization will be able to provide contact with a colleague who may be of direct help in answering an enquiry. The availability of identified materials is of crucial importance: it is of no use knowing about a source of information if getting a copy of the information is impossible. A request for a specific document should present no difficulties if adequate bibliographic detail is available and the sources discussed are accessible. After looking at the possibilities of satisfying a request using internal resources, the search should follow the pattern of local, requesting the information first from other libraries within the country, then abroad if necessary (e.g., BLL, AGLINET) and then from the institutions that published them.

We have considered some of the main printed and mechanized sources of information that exist in any field. Each specific field or discipline will have its own core of source material, with which one must be fully conversant to answer enquiries rapidly.

Summary

The main objective of this section has been to offer advice on:

- How to keep up-to-date records and use the most up-to-date sources of information in a particular field;
- How to ensure that requests are answered rapidly;
- How to find documents not available in your own institution; and
- The importance of nonconventional sources of information.

Exercise

The group was asked to participate in a short exercise which was later discussed in our evening session.

- Write a biography of yourself or a person about whom you have sufficient information, using the style in this presentation.
- Can you name two good sources of information for a

question related to (1) agriculture, (2) medicine, and (3) family planning? (Remember, first consider local, then national and, finally, international sources.)

- Each area of research has its own core sources of information. Do you know what these are in your own field? Can you list some?

THE "FAMILY" OF INFORMATION SOURCES

We have already considered the identification of sources of information. We will now consider where they can be obtained. Many do not work in places that have easy access to a large volume of books and journals. Many work in fairly isolated places so that answers to questions about their work have special importance. Where can we easily find documents relevant to our work?

Libraries

The most obvious place is a library. Libraries have been in existence in most countries of the world for many years, and yet access to a good library is still the privilege of a few. This is especially true in less-developed countries, where access to foreign exchange, lack of education, and language barriers have led to a scarcity of books and journals. Formal literature is extremely important to keep us up to date in our chosen field, and yet subscriptions to foreign journals are often scarce in many countries.

The most common type of library is the public library, which serves the general population. Public libraries exist in most large centres of population, with smaller versions at the local level. Despite their good collections of reference materials, however, they cannot be expected to carry the specific material that most research workers need.

Many countries now have national libraries that are really public libraries on a grander scale. The specific function of a national library is to act as a repository of national literature. In some countries, such as the USA, library subject-sectors have their own "national" library, such as the National Agricultural Library and the National Library of Medicine. National libraries vary in their scope and coverage. Some, like the British Library, are able to answer enquiries from all over the world on a broad range of subjects. Some national libraries, limited by funds and staff, are "national" only in name.

University libraries are usually a good source of information on specialized topics: some universities specialize in one or two subject areas and will collect significant documents on these subjects. Very often they will have an information function beyond the academic community. In North America, many universities and colleges serve as repositories of valuable information. In agriculture, the university experimental stations can be relied upon to provide very efficient service to the outside user.

Special libraries of all types spring out of a growing need for information on a given topic. Consequently, there are libraries with special collections on almost every topic to be found in many countries. Such libraries usually provide acquisition lists fairly freely to bona fide interest groups in the user community.

Archives

As part of the national bibliographic process, archives play a vital role in providing access to material of national importance that needs to be kept for posterity. (Records offices of all types are included in this category.) Archives may be either national or institutional: every organization, for example, should keep written records of its work. Archives, however, are not limited to material in printed form, but include film and photographic records as well as maps.

Documentation Services

Documentation centres have grown up out of the need to classify and index bibliographic records when special collections are being organized.

The word "documentation", which is derived from "document", consists of organizing, for the purpose of retrieval, several documents related to one another by content. The functions, planning and organization of documentation centres have been fully explored by UNESCO and regulations have been laid down by UNISIST.

Documentation centres may be classified as national, a network of specialized centres, academic, or specialized by subject (e.g., involved in collecting information on patents and standards).

Documentation centres that are part of the library of a central documentation facility may be regarded as a structural link in the system. In less-developed countries, the situation is often not as advanced as in North America. A country may have a library system but no documentation centre, or vice versa. In North America, a special library is considered a documentation/information centre, such as the National Agriculture Library (NAL).

Other Sources

Government information sources are also important, as most government offices or levels of government have some information function of use to searchers. However, bias may be a problem when using government sources: although governments provide information freely as part of their mandate, limits are placed on the use of government information depending on the type of department involved. In some countries, it is often impossible to gain access to government planning data even though there is facility for documentation of that type of information.

International agencies are now very important sources of information. Within the United Nations system, major progress has been made in identifying, cataloging and describing information pertaining to the role of a particular agency (e.g., the IAEA or FAO) that has a completely developed international information system (in these cases, INIS and AGRIS). The first Report of the Secretary-General, which was submitted to the General Assembly at its 31st session, summarizes the major activities (both existing and planned) of organizations in the United Nations system in the field of scientific and technical information. These were broadly subdivided on the one hand into actual information programs, and information systems and services on the other (IOBIS 1980).

As regards information sources outside the United Nations "family" of organizations, an encyclopedia on information systems and services (Kouzas and Schnitzer 1971) lists 840 systems and services. Also in 1971, the OECD in Paris published an inventory of the activities of international organizations in the information field, including a list of 32 organizations outside the United Nations. Because information sources outside the U.N. system are so broad, it is not possible to discuss all of them here. There are, however, several guides such as the FID/CAO Guide to Agricultural Information Sources in Asia and Oceania, which lists 172 public and private information services in one subject area alone.

The private sector must not be forgotten. Private organizations such as the International Coffee Organization and the Rubber Research Institute of Malaysia have very important special collections of literature. In particular, these organizations often include much valuable nonconventional literature on special subjects, as well as the results of advisory work and consultants' reports. They also often have well-established patent data bases that are commercially available, as well as special systems that bring together "vendors" of software (i.e., organizations having licences to sell). Most nongovernmental international organizations maintain some form of information service: although primarily intending to serve the interests of their own select group of users, such organizations are also prepared to serve a wider clientele.

Finally, we should not forget to include scientific and fraternal societies of all kinds. In China, for instance, scientific societies have a special role to play in this respect. The Chinese Chemical Society is the licensee of Chemical Abstracts for China. Professional groups have a common purpose in sharing information on their subject. This information is often published either as proceedings of an annual meeting or through regular bulletins or newsletters for members. Some professional newsletters are very important sources of information and contain, in addition to news items, current awareness lists of new publications of interest to society members.

A lot of information passes quite freely between scientists and professional colleagues at such events as international conferences and symposiums. Scientists from less-developed countries as well as graduate students benefit less from this type of information exchange because they are often less able to participate. Nevertheless, it is important to know what one's colleagues are doing and where they are traveling as they themselves are important repositories of information.

Summary

The main objective of this lecture has been to review the main institutional information sources and examine the usefulness of each as a source of information. Some of the differences between developed and less-developed countries have been mentioned.

Specifically we have discussed:

- The library system and its infrastructure;
- Documentation centres, which provide retrieval of information on various subjects;
- The U.N. system and its leadership role in providing information to the international community; and
- The importance of nongovernmental organizations as sources of information on special topics.

Exercise

The participants were asked to complete a short exercise the results of which were discussed at an evening session.

- We have discussed the role of national libraries and have distinguished these from other types of libraries. What is your experience? What is the main library you rely on? What is its value in terms of your interest? Can you describe its special characteristics?

- We have discussed the U.N. "family" of information services. Bearing in mind your subject area and that of your organization, which U.N. agencies would you expect to approach for international references on your subject? Can you describe the type of service the agency you choose is expected to provide?

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INFORMATION RESOURCES AND HOW TO USE THEM EFFECTIVELY

K.P. Broadbent

IDENTIFYING THE NEED

Applied research means problem-solving - identifying a real (rather than hypothetical) problem, finding a solution, and applying the solution to make the problem disappear.

Problem identification is done largely by scientific and technical staff. It requires a continuing dialogue with the people that the institution was set up to serve - the homemaker, food processors, equipment manufacturers, regulatory bodies, or other scientists - through consultation, correspondence, meetings and visits. Information staff can also sometimes identify problems - a point that I will return to later.

When a problem has been identified, one must confirm that it has not already been solved elsewhere. This involves a search for specific recorded information before a research project starts. To keep abreast of their subject, research workers have a continual need for information in somewhat more general areas; and as the research project develops, there is a repeated need for more detailed information, especially if several institutions are working on the same topic. Thus, information is required throughout the entire research process. There is nothing new in this statement, of course; but who should try to provide this information?

THE INFORMATION HUNTER

The sort of person needed is not a professional librarian in the traditional sense. Certainly there is a place in any organization for someone primarily concerned with the orderly collection, storage and retrieval of documents. But to serve the research workers effectively and even anticipate their needs, what is also needed is someone with far more than a smattering of knowledge in appropriate disciplines, someone with a natural curiosity, sensitivity in selecting and evaluating information, reading knowledge of several languages, fortitude and tenacity, and a great sense of service. If the research staff are the growers of new knowledge, this person can be seen as a hunter or forager, who selects from a large quantity of material and presents it in the right place at the right time, in the form that can be most easily assimilated. Such paragons are rare but they turn up in the most unlikely places - some do work as librarians - and they should not be barred from contributing because of a lack of paper qualifications.

The information profession is at present full of talk about "user-friendly" systems, which will allow the end-user to sit down at a computer terminal, key in a question, and receive an immediate, clear and relevant answer. Such systems are technically possible today and without a doubt will operate very efficiently in a "yellow pages" situation. I am on the other side of the argument, however; the side of those who see an increasingly important role for the information intermediary. We have yet to come to grips with the problem of finding or producing such people, and of giving them adequate recognition through both salary and professional esteem.

You may already have one on your staff. Studies have shown that in many research organizations one or two scientists have significantly more contacts with their peers inside and outside the organization than their co-workers do. They are consulted more frequently by their colleagues and their advice carries weight. In fact, they operate as a hidden information service and have come to be called "gatekeepers". They often publish prolifically and thus appear exceptionally productive; but in some extreme cases, they may appear less productive than their colleagues because they are contributing significantly but invisibly to the work of almost everybody else.

SOURCES OF INFORMATION

Where should the "hunter" obtain information? A gatekeeper will already have his or her own informal network of contacts, but more structure is needed if a reliable and comprehensive job is to be done.

The first place to search is usually the nearest - the institution's own library. The resources that should be or can be provided by an institutional library vary tremendously according to such factors as location, ease of communication, and proximity to other libraries, not to mention the budget of the institution. I want to suggest, however, that not even an ivory tower is self-sufficient, able to collect and process all of the scientific and technical information that it may need.

Information staff form a large part of any large organization or institution and, in this era of austerity, libraries and information services are among the first targets of the knives of accountants, who find it difficult to assign a dollar value to them. The vicious circle has to be broken: low budgets, leading to poor services, leading to decreased use, leading back to low budgets. The fact is that costs are high. In many countries, for example, journal subscription rates are escalating much faster than the cost of living. The solution lies in sharing: "systems" and "networking" have become information watchwords in the last couple of decades, a reflection of the growing interdependence of scientific research establishments, and of scientific and technical libraries and information services. This principle is not new - libraries have been lending to one another for years.

I suggest that all institutions should borrow and lend as far as possible: they should put their library and information resources into staff with intellectual competence rather than into document collections built in anticipation of needs that may never materialize.

This advice is hard for developing countries to take. Developed countries have well-established interlibrary loan arrangements; they can depend extensively on major repositories such as the British

Library Lending Division or the Canadian Institute for Scientific and Technical Information, which have great resources, good communications and short response time. All research institutions should have a collection of books and journals that are required often and quickly. This basic collection may have to be larger in an isolated developing country (despite the constraints of budgets and foreign exchange), but should be kept as small as the accessibility of alternative sources permits. Each institution will have to strike its own compromise between speed and cost, and between journal subscriptions and photocopy purchases.

INVENTORY SYSTEMS

Even with tight budgets and escalating subscription rates, it is usually cheaper to subscribe to a journal than to buy three or four photocopies of articles in it in the same year. Indexing and abstracting journals, consulted regularly by information staff, can indicate quite clearly which journals should be subscribed to.

A major indexing and abstracting service covering food processing is Food Science and Technology Abstracts, published by the International Food Information Service (IFIS), a consortium of German, Dutch, British and American institutions. It contains about 6000 bibliographic entries per year and, with the accompanying indexes, sells this year for about US $900, a large amount for poor institutions without the necessary foreign exchange. Selected developing-country institutions do contribute material, but IFIS is essentially a service of most use to developed-country institutions.

Over the past decade or so, however, international cooperative information systems have been appearing on the world scene. They provide for an equitable sharing of information among countries, consistent with the precepts of the New International Economic Order; assisting developing-country institutions to participate in them is, therefore, a major plank in the IDRC information sciences platform. Food and nutrition are included in AGRIS (the International Information System for the Agricultural Sciences and Technology), which is coordinated by FAO on behalf of about 100 participating countries. Since 1975 when it went into operation, AGRIS has grown into the world's largest data base in subjects within FAO's purview. It is now collecting and indexing about 130,000 bibliographic references a year, about 8% of which are related to food science and technology and human nutrition. The amount of developing-country literature captured is growing, particularly the nonconventional literature so prevalent in developing countries: these countries have few journals of their own and have difficulty publishing in developed-country journals. AGRIS captures its records by means of the "territorial formula": an institution is named by each participating country to be responsible for collecting and processing all (and only) the literature generated within that country. This immediately avoids the duplication of intellectual effort entailed in many institutions trying to collect and catalog all the world's literature at the same time. It also means that the national institution has to establish some organization over the production and dissemination of national literature: such items as national bibliographies can thereby be compiled and clear feedback given to the authorities responsible for the allocation of research resources. Following the processing rules established by the AGRIS Coordinating Centre with the agreement of all parties, each national centre sends bibliographic records to FAO and in return has access to the entire file on magnetic tape and in printed form (Agrindex), which can be used as the basis for local information services. The document delivery aspect of AGRIS still requires further development; but with modern technology, all participants could have a microfiche file of all the documents listed in AGRIS, stored in serial number order, and made accessible through Agrindex - a simple arrangement that would eliminate the need for local cataloging. The technology is here; the restraints are budgetary and organizational.

SPECIALIZED INFORMATION ANALYSIS CENTRES

AGRIS is es[illegible]tially an inventory type of system. It attempts to [illegible] and index all the literature produced in the [illegible] within a defined subject scope. *Food Science and T[illegible]ology Abstracts*, within its much more limited subject scope, performs information analysis in somewhat greater depth by including abstracts and using more detailed indexing.

There is a widely expressed need for information not only to be selected but also to be evaluated and consolidated. A young research worker in a developing country, for example, who has little opportunity to travel and establish contacts with foreign peers, may receive as a result of an information search a long and relatively useless list of references to documents that may contain the information he seeks. There is little hope of collecting them all, never mind reading and assimilating them, and thus needs advice on what is best. This brings us to another important plank of IDRC's information sciences platform - the specialized information analysis centre (SIAC), which does for a national, regional or global clientele essentially what the gatekeeper and the information hunter do within an institution. SIACs were pioneered in the USA after Sputnik had stimulated a lot of new thinking. They proved to be particularly effective in the nuclear energy industry and have been copied elsewhere, especially in agriculture.

SIACs have some common characteristics. They usually focus on a tightly defined subject area, as narrow as a single crop. This not only lets the user know clearly what is covered and what is not, but also delimits information handling so that it can be done in considerable depth within a reasonable budget. SIACs involve scientists and other specialists, who are preferably on staff but, if not, are working within the parent institution. The specialized knowledge of these people can then be drawn upon daily, and they can act as effective sounding boards to ensure that the information centre is responsive to the needs of its users. To achieve such a satisfactory arrangement, an information centre must be located at a "centre of excellence" for the topic concerned; in fact, it is a precept of the IDRC program not to support an information centre that does not meet this criterion. The scientists and the information staff have a symbiotic relationship, and, harking back to my opening remarks, the parent institution itself can be regarded as the information centre.

SIACs collect literature within their particular subject area, abstract it, index it in depth and set up a document storage and retrieval system so that literature searches may be performed in response to very specific requests. They may also compile directories - of research workers, institutions, equipment manufacturers, etc. They may publish newsletters and act as the hub of a communications network. Some of them host conferences or publish refereed scientific journals with high reputations. Generally they can be described as "making the invisible college visible".

In addition to this essentially bibliographic work, they have the important function of evaluating information - a delicate subject with authors - and of answering questions with actual information rather than with lists of references to documents. The latter service may require referral to an appropriate expert at the host institution or elsewhere, and the answer to the question may be a specially written letter. A related function is the generation of new information from existing information by commissioning state-of-the-art reviews. SIACs may even point to gaps in information that should be filled by further research. Such activities can be coupled with conferences or workshops, where a variety of relevant background material can be provided.

SIACs do have their problems. There is the danger of by-passing the mechanisms of refereeing and peer review, which, despite their faults, have not been superseded by anything better. They may tend to reinforce conventional wisdom when heretics are needed. Funding can be a problem, particularly in centres established to serve developing countries. Nevertheless, some of the institutions represented here may wish to consider establishing a specialized information analysis centre in some aspect of food processing or nutrition.

PUBLICATION AND DISSEMINATION OF RESULTS

Information systems and services like the ones I have referred to are aimed at the research worker: they cannot operate if research results are not documented and disseminated. This may seem obvious to the developed-country worker who has to "publish or perish", and who may even see publications as the be-all and end-all of research. In many developing countries, however, there is far less pressure to publish, particularly because there are few relevant journals in developing countries and the papers of unknown authors in developing countries may be rejected by Western journals. If a paper is accepted in a Western journal, it may not appear for as long as 18 months; and only after that can it be picked up by an abstracting journal or data base. If the paper is published in a developing-country journal, it may escape attention altogether.

This situation reinforces the desirability of an in-house publishing facility; for technological work, as opposed to basic science, a series of publications may be a more appropriate way of disseminating an institution's research results. Unfortunately, it is not uncommon to find research institutions that have not published an annual report for several years and have a huge backlog of scientific drafts that have not reached the printer. The research workers then tend to operate in isolation, never receiving feedback from outside nor having the opportunity to see others build upon their work. Much attention must therefore be paid to the production of the final documents that record the research work in considerable detail so that its worth can be estimated, and the research process can be completed. Because many scientists are poor writers, particularly if they are writing in a foreign language, institutions may have to recruit a full-time editor, as well as someone who knows the ins and outs of the printing trade and can see publications through from the edited draft to print.

Whatever method is chosen for the actual publication, the dissemination of the information should not be left to chance. A determined effort should be made to direct all of an institution's publications to the appropriate depository libraries around the world, to FAO, to the major indexing and abstracting services such as IFIS, and to the national AGRIS centre so that they can be included both in AGRIS and in the national agricultural bibliography. Peer institutions will probably be on the mailing list and their libraries should enter into agreements for the exchange of publications. If there is a specialized information analysis centre working nearby, then of course there should be a close two-way flow of information.

APPLICATION OF RESULTS

All of this, however, is not enough. Research workers feed on research information and in turn produce more of it for other research workers. At worst, this is the "ivory tower syndrome", which is not what we are here to discuss. Problem-solving research has a purpose: applied research is the creation or systematic adaptation of new knowledge for human benefit. In the context of IDRC's program, "benefit" means the economic and social benefit of the poorer peoples of the world. Although new information may not be directly taken advantage of by these people, it should be applied for their benefit. In other words, their needs must be taken into account in defining the objectives before the applied research is undertaken. Thus, the information circle is complete: the same information beneficiaries (the so-called end-users) appear at the start and the finish of the research process. If they do not, the research has probably failed. Those of you who serve a different clientele - perhaps a more literate one - may be able to contact the end-user directly. But the same principle applies: the intended beneficiaries should benefit in the end.

It is not enough for research establishments to publish only for scientists and technologists. If research results are to be used in the field, they must be interpreted and converted into a form that the end-user can both understand and assimilate. This is perhaps the most difficult task of all, one that deserves more attention and research. There are many techniques available which may also be used to get feedback, to establish further needs, and thus to start a fresh research cycle. Several communication channels using different types of information intermediaries can reach the end-user (e.g., conferences, training sessions, popular science writing and radio programs). Whether the message is accepted depends very much on the medium: for many users, nothing can replace a face-to-face meeting. The national extension services have an important function here, particularly where many users are illiterate or where vernacular languages must be used. In technological fields, perhaps the most effective way of imparting new information is by demonstration; and scientists and technologists should be involved in such interpretations of their results. If buzzwords like "appropriate technology" and "technology transfer" are preferred to the word "information", information professionals have only themselves to blame for talking their own jargon, concentrating on sophisticated technological solutions, and for not doing enough research into the information transfer process. A change of attitude is needed on the part of information professionals as well as research managers if applied research for economic and social development is to show significant results.

COSTS

In the last decade, information has come to be regarded as a resource that has a price and therefore a value. It is an unfortunate quirk of human nature that anything provided free tends to be downgraded. On the other hand, information services set up to serve the poor can hardly charge cost-recovery prices, which the poor cannot afford. Suitable budgetary arrangements must therefore be made. Information budgets do tend to be relatively high mainly because many information services entail relatively inexpensive activities that are performed a large number of times. The incremental cost of processing a new document and entering it into a data base may be as high as $100, an insignificant amount compared with the cost of producing the document, which may be the result of a lengthy piece of research work involving staff and capital equipment. The benefit is especially great if this small extra expenditure prevents redundant or unnecessary work.

CONCLUSION

"One of the diseases of this age is the multiplicity of books; they doth so overcharge the world that it is not able to digest the abundance of idle matter that is everyday hatched and brought forth into the world".

We have made some progress since 1613 when that was written. Nevertheless, we all need to make a continual effort to ensure that what is produced is not idle matter, that information is distinguished from documents, that systems are not designed to handle mere paper but to take account of what is written upon it, and that information is produced according to need and applied where it is needed.

I have intentionally not written what is unfortunately a common paper in the information world - the "How-we-done-it-good-in-Ottawa-Ontario" type of paper. Nor have I tried to tell you how to organize your own institutions. I have certainly glossed over many problems. I hope, however, that I have given you some food for thought.

NONCONVENTIONAL INFORMATION

J.B. Wills

DEFINITION

Nonconventional information comprises documents, abstracts or summaries that are not bibliographically controlled in formal information systems. Nonconventional information is not normally sold or issued to a wide audience, but is usually available on request to interested readers within informal systems and is therefore considered to be "published". It does not include items that are unavailable to the public (e.g., "restricted" reports) and which are therefore unpublished.

FORMAL VERSUS INFORMAL INFORMATION SYSTEMS

Formal systems include libraries, information bureaux, in-house documentation and retrieval services, etc., with staff who are paid to bibliographically control the documents and information handled.

Informal systems consist of "invisible colleges" (i.e., groups of people who share common interests but are geographically separated) that voluntarily exchange documents and items of information but do not bibliographically control them.

NONCONVENTIONAL INFORMATION IN INFORMAL SYSTEMS

The information exchanged within or produced specifically for an informal system mainly comprises:

- Documents that will not appear in formally published form for 6-12 months (especially conference papers);

- Documents that are not expected to be published in final form until after further discussion by members of an invisible college (e.g., position papers and provisional institution reports);

- Documents that are intended solely for informal publication (e.g., institution reports and papers aimed at a known small audience of interested recipients); and

- Copies of or extracts from formally published documents preselected for the recipient so that they closely relate to a specific subject (e.g., selected abstracts and documents in answer to a subject enquiry).

Volume and Value of Nonconventional Information

Information from the first three sources above normally constitutes between 5 and 15% of the volume of conventionally or formally published documents. It is sometimes referred to as the "gray" or "fringe" literature, mainly because it is small in volume and is not normally subjected to peer review. However, all producers and users of nonconventional information attach great importance to it because it enables its users to give and receive information about new developments in subjects of interest to them. This exchange, in fact, is the reason that informal information systems exist.

FUNCTION OF VOLUNTARY INTERMEDIARIES IN INFORMAL SYSTEMS

Facilitative Activities

Informal systems are often centred on the activities of a group of people who facilitate the exchange or flow of information, perhaps by publishing a newsletter or by functioning as an information clearing house. An example of such a newsletter is the Newsletter of the International Working Group on Graminaceous Downy Mildews. The editor is a member of staff at the International Crops Research Institute for the Semi-Arid Tropics, but the newsletter is not an Institute publication. Publishing funds are provided from sources within the Group; the time required to "operate" the informal system is provided by Group members, who regard this time as being well spent because of mutual benefits.

Relationship with Professional Intermediaries

Voluntary intermediaries produce highly relevant work because they are at the focal point of an informal system and are skilled in interpreting the needs of their users. Professional intermediaries are less skilled in such work because they are normally concerned with a large number of subjects and disciplines. Voluntary intermediaries, however, often lack the professional's access to relevant world literature and therefore handle less compehensive information. Thus, intermediaries in both informal and formal information systems have much to gain from collaboration.

IMPROVING USERS' ACCESS TO NONCONVENTIONAL INFORMATION

The manager of an information centre can improve the users' access to nonconventional information in a number of ways.

First, he/she should study the relationship between formal and informal systems in subject areas covered by the information centre. If no user survey is undertaken, the manager should find out what informal systems are of interest to the users of the centre. He/she should establish contact with relevant voluntary intermediaries, in order to make the centre an institutional member of their informal information systems and to gain access to the information exchanged within them.

Next, the volume of conventional and nonconventional information relevant to these informal systems should be estimated. This may best be done by comparing data on the number of formally published documents appearing per year on specific subjects with estimates about the number of new nonconventional documents on the same subjects circulated annually (which can be derived from discussions with voluntary intermediaries).

Finally, the manager should decide if action is to be taken by the centre to bibliographically control new nonconventional information of interest to its users. There are a number of options, depending on the size and type of the centre and the number and importance of the informal systems:

- Take no action, on the grounds that users are being reasonably well served by the existing combination of formal and informal information systems;
- Establish close working relationships with the voluntary intermediaries involved so that information is obtainable on demand, when required;
- Agree with the voluntary intermediaries that the centre will be a repository of the information handled by the informal systems; the informal systems can therefore continue to function as they are but the nonconventional information that they handle may be bibliographically controlled; and
- Agree with the voluntary intermediaries that the centre should assume responsibilities as an intermediary and as a repository of all the relevant information formerly handled by the informal systems.

Experience suggests that the third option is more efficient and operationally cheaper than the fourth option, and is therefore the preferred one.

COMPUTERIZED DATA BASES: BIBLIOGRAPHIC AND NONBIBLIOGRAPHIC

Hwa-Wei Lee

COMPUTERIZED DATA BASES

Definition

A computerized data base is a collection of information in machine-readable form accessible by computer. Many such data bases, particularly those containing bibliographic citations, are created (at least initially) as by-products by print-medium publishers or organizations and then used for electronic distribution.

Scope

With the advent of computer and telecommunication technologies, and the pressure of the "information explosion", the number of computerized data bases has grown annually at an exponential rate since its inception in the late 1960s. According to 1980 statistics, there were no fewer than 600 computerized data bases in the world with total records exceeding 75 million (Hall and Brown 1981:7). These data bases differ in a variety of ways: subject, scope, geographic and chronological coverage; periodicity of release; and frequency of updating. In addition, they differ in the type of information or data that they contain.

Classification

A commonly used classification of data bases is the one employed by the Directory of Online Databases (Landau et al. 1980:7), which groups computerized data bases into two major types (i.e., reference and source) and six subtypes (i.e., bibliographic, referral, numeric, textual-numeric, properties, and full-text).

Reference data bases

Reference data bases refer users to another source (e.g., a document, organization, or individual) for additional details or for the complete text. They include two subtypes:

- Bibliographic data bases, which contain citations and sometimes abstracts of the printed literature (e.g., journal articles, patents, dissertations, conference proceedings, books, or newspaper items); and

- Referral, which contain references and sometimes abstracts or summaries of nonpublished information, and which generally refer users to organizations, individuals, audiovisual materials and other nonprint media for further information.

Source data bases

Source data bases contain complete data or the full text of the original source information. They include four subtypes:

- Numeric data bases containing original survey data or statistically manipulated representations of data;

- Textual-numeric data bases, which are usually data bases of records that contain a number of data elements or fields with a combination of textual information and numeric data;

- Properties data bases, which contain dictionary or handbook-type data, typically chemical and physical properties; and

- Full-text data bases, which contain records of the complete text of an item (e.g., a newspaper item, a specification, or a court decision).

DATA-BASE PRODUCERS AND ON-LINE SERVICES

Producers

Data bases are developed by a group of suppliers referred to as "producers".

Producers of reference data bases

In many cases, these producers are primarily publishers of printed index and abstracting journals. Either public or private organizations, they acquire, screen, select, index, and sometimes abstract or summarize the primary literature. To produce their printed publications, these organizations have adopted automated systems for phototypesetting that generate magnetic tapes that can be used further for computerized processing, particularly in storage and retrieval systems.

Producers of source data bases

Some producers are publishers of reports and other publications. Some have, as their main line of business, research, consulting, and advisory services in the area covered by the data base they produce. Still others are government agencies that have a responsibility for the dissemination of information collected or generated in their particular areas. Some producers process and package data into data bases that were originally collected by some other service. In their packaging, these producers frequently bring together data from a number of different sources and sometimes increase the value of a collection by including additional data that they generate, such as forecasts.

Types of producers

Producers may be classified by organizational type. The following lists examples of organizations (and some of their data bases) within each type.

Commercial organizations

Aircraft Technical Publishers	AVCOM (textual-numeric)
Chase Econometric Associates, Inc.	International Forecast (numeric)
Source Telecomputing Corp.	THE SOURCE (bibliographic, referral, numeric, textual-numeric)

Government organizations	
National Library of Medicine	MEDLINE (bibliographic), SERLINE (bibliographic)
Smithsonian Science Information Exchange	SSIE (referral)
U.S. Census Bureau	Current Population Survey (numeric)
Professional society organizations	
American Petroleum Institute	APILIT (bibliographic), APIPAT (bibliographic)
Chemical Abstracts Services	CA SEARCH (bibliographic), CHEMDEX (properties)
Institution of Electrical Engineers	INSPEC (bibliographic)
International agencies	
Food and Agriculture Organization of the U.N. (FAO)	AGRIS (International Information System for the Agricultural Sciences and Technology) (bibliographic)
International Atomic Energy Agency (IAEA)	INIS (International Nuclear Information System) (bibliographic)
International Patent Documentation Centre	INPADOC (bibliographic)

On-line Services (or Vendors)

Vendors are those organizations which provide on-line access to data bases. Most producers make their data bases available to these on-line services, although some prefer to distribute their own data base on-line. Some producers also provide the software or computer programs through which their data bases are used on-line; in these cases, they are also producers of data-base systems.

The best known, major on-line data-base vendors in the U.S. are as follows (Chen and Schweizer 1981:7):

- DIALOG Information Services, Inc. Until June 1981, DIALOG had been located within the Advanced Systems Division of the Lockheed Missiles and Space Company, Inc. DIALOG is the outgrowth of the first large-scale, on-line bibliographic retrieval system (RECON) built for the National Aeronautics and Space Administration in 1969.

- Systems Development Corporation (SDC). Its ORBIT is the outgrowth of work done for the National Library of Medicine on the retrieval system called MEDLARS. ORBIT became fully operational in 1973.

- Bibliographic Retrieval Service (BRS). BRS began offering its facilities in January of 1976.

SEARCHING ON-LINE DATA BASES

Interaction Between Searchers and a Data-Base System

Searching of an on-line data base involves the direct communication between a searcher and the computer system using a conversational program dialogue. The searcher, using a specific set of predefined commands, directs the computer in searching machine-readable indexes for certain information. By typing the appropriate commands into a terminal, the searcher can tap the resources of the entire system (Chen and Schweizer 1981:2).

On-line search is interactive and in many ways resembles a conversation between a searcher and a computer system. Thus, the user can review the response to his/her enquiry and, if the results are unsatisfactory, modify the enquiry and review new results. This process of review and modification allows the user to search a data base carefully and systematically until results precisely fulfill the original information need. This interactive searching is possible through the use of a telecommunications network. The two most commonly used ones are TELENET and TYMNET. [Slides were presented to illustrate these.]

Advantages and Shortcomings

In searching on-line data bases, there are obvious advantages and shortcomings (Chen and Schweizer 1981:5-6).

The advantages listed by Chen and Schweizer are as follows:

- Speed: The time required to complete most searches is 10-15 minutes, a fraction of the time required by a corresponding manual search in printed indexes.
- Flexibility: On-line data-base searching increases the number of points by which an information source may be accessed. Examples of added access points include language, type of publication, codes, author affiliation, price, country of publication, and abstract. These additional access points enable a searcher to tailor a search to a client's precise needs.
- Comprehensiveness: An organization need not regularly purchase, store, and organize large numbers of sources in anticipation of an information need. Access to on-line bibliographic data bases enables an organization to comprehensively acquire those bibliographic information sources when it needs them.
- Currency: Machine-readable indexes are generally updated on a monthly, weekly, or even daily basis. Thus, the information included is usually more current than that contained in manual indexes.
- Convenience: On-line searching can be done anywhere near a telephone and an electrical outlet.
- Cost-effectiveness: The results of a comprehensive,

multifaceted search take far fewer person-hours to produce through on-line searching than the same results produced through manual searching. The search time is greatly reduced; the clerical time required to produce a typed bibliography is eliminated.

- Enhanced job satisfaction: The use of tools such as these gives information professionals the ability to deliver much more information in much less time. On-line data-base searching enables them to serve their users with a thoroughness and skill previously impossible.

The shortcomings are as follows:

- There is a lack of information for retrospective searching because data bases usually only represent literature from 1970 forward.
- As most data bases are in the fields of applied and pure sciences, medicine, agriculture, social sciences, and education, there is a substantial gulf in the area of the humanities.
- Malfunctioning computer systems, terminals, or communication lines can cause the data bases to be inaccessible for a certain period of time. Malfunctions can also occur in the middle of a search, resulting in a lost search, wasted money and time, and much frustration for both the searcher and the requestor.
- Because the costs of searching are visible and direct, financial arrangements must be made to cover or recover expenses.

There are two other shortcomings in addition to those mentioned by Chen and Schweizer:

- Lack of standardization among various data bases and vendor systems makes it difficult for the searchers and users to learn the searching techniques and to master them. It also discourages the search of several data bases at the same time to save time and money.

- Because of the inability to achieve a high level of specificity in indexing documents, the precision rate in retrieval in many on-line searches is often disappointingly low.

Types of Searches

Most of the on-line data bases are capable of the following searches (Chen and Schweizer 1981:12):

- A retrospective search is a search of a data base going back to the earliest dated documents.
- A comprehensive search encompasses all pertinent data bases, all time periods, and a variety of document types.
- A short search is executed to locate a few precisely appropriate articles on specific subjects or by a specific author.
- A SDI search is run on each new update of the data base. This type of search is designed to keep a person up to date on a particular topic.
- A ready-reference search uses information in an on-line data base as an aid in the reference function, such as to verify citations for interlibrary loans.

Cost of Searches

Despite the fact that costs of searches are calculated differently by each on-line service (or vendor), they can usually be broken down into the following categories (Chen and Schweizer 1981:121-133):

- Data-base charges can vary from $15 per connected hour for MEDLINE (subsidized by the National Library of Medicine) to over $100 per connected hour for commercially produced and highly specialized data bases such as INFORM.
- Subscription and discount charges, such as DIALOG and SDC charges, are based on actual use with discounts for large-volume users. BRS has a

subscription plan (a certain number of hours purchased for the year at a fixed amount).

- Royalty fees are charged by BRS for both on-line searches (per hour) and off-line printing (per page or citation) on certain data bases.
- Telecommunication charges for the use of either TELENET or TYMNET, for example, vary from vendor to vendor. For example, for the use of TYMNET, both DIALOG and SDC charge $8/hour, and BRS charges $7; for TELENET, DIALOG charges $5/hour, SDC charges $8, and BRS, $7.
- Other charges may include stored search charges (both DIALOG and SDC have such charges), and SDI service fees.

It is to be noted that the above costs of searches do not include hardware, personnel, and training costs.

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INSTITUTIONAL MANAGEMENT

FACILITY PLANNING AND MANAGEMENT

M. Beckman

RELATIONSHIP OF PHYSICAL ENVIRONMENT TO SERVICE OBJECTIVES

The past two decades have seen a tremendous growth in North America in the number of new library buildings and of information centres in the new buildings of organizations and government agencies. Too frequently, however, the library or information centre staff have realized, after moving into their new facility, that the services they had planned to offer could not be readily or economically provided. Perhaps this can best be illustrated with examples from Canadian libraries, in which you should be able to identify at least some of the following problems:

- Lack of communication between architect and library information centre staff;
- Absence of a library or information centre consultant;
- Complete lack of understanding on the part of the architect (and probably of the information specialist as well) of the relationship between functions, the needs of users, and the physical environment of the building or facility; and
- Failure to recognize the implications of new technology and the impact on both the services offered and the methods by which they are offered.

If mistakes are not to be repeated - at great cost to the public - an organized planning procedure should be undertaken: this will result in an integration of the design of the library or information system and the building or space within which it is to be implemented. By organized planning, I mean the establishment of a building committee (or planning committee) on the day that the decision to build, expand or renovate a library or information centre is made. This committee should minimally include the following people:

- The librarian who will be in charge of the new facility (or a staff member delegated to the planning task full-time, if it is a particularly large project);
- The architect;
- A library consultant;
- One or more representatives of the users; and
- A chairman familiar with planning procedures and able to analyze the ideas that the committee will produce.

Having established its objectives and responsibilities, the committee should begin by discussing the administrative, functional, financial, procedural and motivational issues involved. The importance of the relationship between the objectives of the institution or organization, library or information services, and the evolving space design and layout cannot be overemphasized. This will eventually lead to the library/information centre policies and design parameters.

Although various members of the committee will have specific responsibilities, the role of the librarian or head of the information centre in the planning process will be to formulate the philosophy of service and to define a system that will meet the specific needs of his/her users. The simplest way to do this is to find the answers - from the staff, from visits to other libraries/information centres, and from user representatives on the committee - to a series of questions related to the three major components of the library: the collection, users, and staff.

Questions regarding the collection include:

- What is the present size and character of the collection?
- What will its annual growth rate be?
- How will it be organized - by form or subject?
- Will separate areas or special conditions be needed for different materials?
- What method of circulation and control will be used?

Questions concerning users include:

- How many readers should the new facility accommodate, and what standards will be used?
- What different type of facilities will be required, and what percentage of each?
- Will special reader requirements be needed for the use of particular materials?

Finally, questions about the staff include:

- How many staff will there be and in what classifications?
- How much space will be required per staff member, and based on what standard?
- Will computer technology or library networks affect the organization of the staff and the way in which they offer service?

It is at this point that I would like to comment on the tendency of Canadian library/information centre staff to resist change. If a library or information centre is going to operate effectively in the future, it must have the capacity to adapt to change. Too many librarians want to transfer their present activities, with the same concrete walls that now physically isolate them, into a new building; they do not realize that the planning of a new building or space gives them the opportunity to reconsider their philosophies and methodologies, and to identify the functions that are actually being performed. It also gives a second chance to review the most desirable relationships which should exist between them, independent of any physical or emotional considerations.

After considering and visiting other libraries and information centres, the planning committee (with advice from the librarian or director) should be able to formulate service objectives, the requirements necessary to meet those objectives, and the functions that will have to be performed to fulfill the requirements.

The identification of library functions and the crucial nature of their interrelationships is one of the most difficult tasks performed during the planning procedure.

While identifying the functions and services, the librarian must also be defining his or her library management system: the staff organization or dispersement that will offer those services. At this point, an organization chart can be prepared, identifying all staff positions, their classification or category, and their location within the organizational structure. From a management point of view, this chart is useful because it is now possible to identify operational costs for the new facility, and to suggest changes in staff organization and ultimately in the facility design if operational costs are too high.

In addition to identifying the library and management functions and their interrelationships, the librarian should also consider the implication of measurement standards and be able to provide guidance to the committee in this matter. Particular standards, often specified by government jurisdictions, can be obtained from many sources, but several points should be discussed.

At the planning stage, collection space should be measured in volumes per square foot (or metre), and not by a linear method (1 volume per square foot is equivalent to 11 volumes per square metre). Standard capacity ranges from 10 to 15 volumes per square foot. This sizing process should include space for aisles between stack ranges, as well as for cross-aisles and any major circulation aisles required by the fire marshall or any regulatory body. Ten volumes per square foot allows for ranges of only six double-faced stack sections with adequate aisles in all areas; 15 volumes per square foot does not.

Staff space is the most difficult to determine in a library and, as Keyes Metcalf frequently points out, most frequently underplanned. If adequate space is to be provided for the various bibliographic tools, special functional furnishings and equipment, terminals, books in process, etc., a figure far in excess of what is generally accepted for so-called clerical functions - 100 square feet or less - should be used. Space allocation for staff members relates not to status but to the function performed: the efficient operation of a library is highly dependent on the correct relationship of one function to another, on the separation of direct services to the user from the indirect or technical services, and on the logical arrangement of material processing.

The standard for staff space that has been recognized in Canada for federal libraries and in Ontario for academic libraries is 175 square feet per person (16 m^2/person). The recent Canadian Federal Library Survey discusses this standard and states that "this amount of space is not the actual space assigned to a staff member, but an average used for overall sizing purposes."

User space is also difficult to determine, particularly in a special library or information centre. Although the standard for users in Canadian government libraries is, for example, 10% of the potential users, experience indicates that 5% might be a more reasonable figure. This lower percentage of users may reflect the increasing number of information centres that now provide information via on-line terminals to users in their homes or offices, thus greatly reducing the number of reader stations needed in libraries or information centres. It should be remembered that a library/information centre has a social as well as an informational function, and that it should provide a variety of reader stations - carrels, tables, periodical index tables, audiovisual carrels, informal reading chairs, and group study and seminar rooms.

Although the librarian may initiate much of this analysis of library service, functional relationships, and standards of measurement, it is important that this work be done through the planning or building committee so that the design considerations reflect the opinions of the entire planning team.

While the librarian analyzes library functions and possible staffing or service patterns, the architect identifies the implications of the many points under discussion for the actual design process. He/she also becomes familiar with the various library and building standards that must become part of the design considerations. Included in these are the following:

- Although it is recognized that the location assigned to a library/information centre will greatly influence the design, several assumptions can be made based on experience: small, multilevel floors should be avoided as they add to operational costs; core functions such as stairwells, vertical ducts, mechanical transportation, should not be placed in the centre of the building if possible, because they restrict the flexibility of the building; mezzanines are to be avoided; the ideal massing for a library or information centre (from a functional viewpoint) is a rectangle of a 5 to 7 proportion, with the opening on the long side.

- Access must be through one controlled point, located either at street level (to encourage use by the handicapped) or at the highest user traffic point in the building.

- Control in a library can be achieved through mechanical means, such as a detection system, or through a layout that gives the library staff visual "control" of the library. Users can be directed to various areas and functions through a subtle arrangement of furnishings and through use of colour.

- The structural design should complement the most common module to prevent wasted space. In a library or information centre, this module would be the size of a book stack: in Canada, 3 feet; in

Europe, 1 metre. The bay size (i.e., the space within any four supporting columns) should be able to accommodate the module or some multiple of it: in Canada, 21, 24, 27, or 30 feet are acceptable bay dimensions. To permit flexibility, the floors of the entire library should be designed to carry bookstacks: in Canada, the standard is 150 pounds per square foot live load for normal bookstacks, with a 250-pound loading capacity for compact storage (National Building Code).

- Lighting is one of the most important features in any library, and yet libraries with inadequate lighting are legion. By North American standards, the light level should be 65 foot candles on every work surface and 35 foot candles in the stack aisles. The quality and direction of the light are as important as the actual quantity. To compensate for the energy shortage in Canada, emphasis is now being placed on task lighting: this provides direct light on each piece of furniture, such as carrels, and lower levels of ambient lighting. A building with architectural interest achieved through a high ceiling or central light well does not necessarily provide efficient or effective lighting. Large areas of window wells do not support the library function either, as exterior light is harmful to books and creates glare for library users. Individual study carrels, often placed near windows on the perimeter of the library, should be individually lighted with baffled fixtures so that the light is not reflected into the users' eyes.

- Due to the uncertainty of technological changes in future library and information services, the library should be flexibly designed so that a variety of library services, both traditional and innovative, can be offered in all areas. Library collections are changing from a predominantly print format to a multiplicity of nonprint media: videodisc, electronic journals, audio and video cassettes, film, slides, maps, etc. Moreover, systems that connect each library to a larger information network through terminals and data transmission links are a reality, at least in Canada. It is necessary to provide the capability of introducing electrical and communication outlets into any area of the library, whether through an underfloor grid, or through the space in a suspended ceiling or within columns. Both vertical and horizontal communication distribution capabilities should be part of the building.

- The facility should provide a welcoming and pleasant environment in which both staff and user can work. This can be achieved through the thoughtful integration of design, layout and colour, as well as by acoustic control. Because a library or information centre is primarily a place for concentrated study or quiet reading, it is essential that distracting noises be minimized and that any necessary noisy activities be grouped together and isolated from the study areas with acoustic barriers.

- Signage is such an important part of the environment, it should be given separate attention. A well-planned directory system, colour-coded to the various functional areas, can greatly assist patrons in using the library or information centre.

BUILDING PROGRAM

Finally, with objectives crystallized, functions defined in new ways, relationships determined and indicated on a diagram, with sizes, numbers, and measurement standards established, and architectural considerations understood, a written program should be formally set down, whether for a one-room addition or a multimillion-dollar project.

The purpose of such a program is three-fold:

- It presents justification for the new facility in written form;

- It provides a synthesis of policy; and

- It outlines the specific details and basic assumptions that will enable the architect to capture the spirit of the facility, as well as its physical requirements.

The program itself should contain:

- A summary of the essential elements (size, space, costs);
- The objectives and philosophy of the organization or institution;
- Functions and functional relationships;
- A description of all areas;
- Space requirements; and
- Design and site parameters.

Also included may be detailed specifications of each area (called facility sheets in Canada), and a variety of charts, diagrams, statistical tables, etc., which will assist those who read the program - organization presidents, boards of trustees, city councils - in understanding the purpose of the new building.

You may have the impression that planning a new library or information centre is an overwhelming task. I can only assure you that it is well worth the effort to pay attention to an enormous amount of detail, to have a planning committee share the work, and to make extensive use of the consultant member of that committee if necessary: it will result in more functional and effective information centres, which are capable of adapting to the changing social environment and the different needs of users, as well as to the technological advances that are having so much impact on library and information science. Careful planning can result in exciting and yet functional library buildings.

INSTITUTIONAL BUDGETING: DEVELOPMENT, CONTROL, AND REVIEW[1]

Hwa-Wei Lee

DEFINITION

Institutional budgeting is the process whereby an institution's plans are translated into an itemized, authorized, and systematic plan of operation, expressed in dollars, for a given period. Budgets are the blueprints for the orderly execution of program plans; they serve as control mechanisms to match anticipated and actual revenues and expenditures.

The primary purpose of budgeting is to provide an opportunity to examine the composition and viability of an institution's resource base (usually composed of both restricted and unrestricted funds) for each program and activity.

The development of a budget should insure that all institutional activities and programs are examined simultaneously to determine, in light of available resources, which ones should be supported and to what degree. The process should communicate the institution's priorities to various constituencies, identify specific commitments, and establish preliminary control over its resources. The result of this process is a document that is used to monitor and control the institution's ongoing operations.

There are two types of budgets:

- An operating budget, which is a financial plan of current operations that encompasses both estimated revenues and estimated expenditures for a specified period (normally 1 or 2 years); and

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[1] The major source used here was NACUBO (1982).

- A capital budget, which outlines expenditures for new construction, major repairs or renovations, and major items of equipment, often for a specified period of 1 or more years, depending on budget requirements.

FACTORS AFFECTING THE BUDGET PROCESS

A number of factors, both internal and external to the institution, have significant influence on the development and implementation of the budget.

Internal factors include:

- Mission and goals of the institution,
- Fiscal policies,
- Type and degree of accountability,
- Management style,
- Debt policies,
- Compensation goals and policies, and
- Pricing policies.

External factors include:

- National plans and network requirements,
- Government policies and regulations,
- User demands and needs,
- Information resources and services available elsewhere,
- Sources of funding, and
- Inflation.

BUDGET DEVELOPMENT

Participants in the Budgeting Process

Participants vary according to the type of institution and its governance. Major institutional participants in the budget development process usually include the governing board, chief executive officer, senior administrators, budget officer (who is often the chief business officer), and planning and budgeting staff. The success of the budgeting process depends on the leadership and support of the chief executive officer and the commitment of the institution's staff. The roles of participants are as follows:

- The governing board (or higher authority) oversees the process, reviews the institution's mission, evaluates the effect of internal and external factors, evaluates competing program goals, reviews proposals for new programs, and reviews and approves the institutional budget.

- The chief executive officer initiates planning and budgeting efforts, communicates with the planning and budgeting staff, approves policies to be used in developing the budget, reviews program plans and budgets, approves budget recommendations, and presents the budget to the governing board.

- The planning and budgeting group is typically composed of senior administrators, and sometimes includes representatives from constituent groups. The chief executive officer should serve as chairperson of this group, which is the determining body in the development of the institution's short- and long-range plans and budget.

- The budget officer (or chief business officer) coordinates budget activities among operating units, works with the planning and budgeting staff and constituent groups, develops the schedule for the preparation and implementation of the budget, coordinates the data base for budgeting, prepares the budget for presentation to the governing board, and may be responsible for developing and implementing a system of budget control.

Developing the Operating Budget

The operating budget, which is specific and detailed, presents the plan to finance approved programs and services for a set fiscal period. Individual unit budgets are developed by unit heads, using institutional budget guidelines approved by the governing board, with appropriate input by unit staff. The traditional operating budget is then developed by integrating all unit budgets.

There are five major steps in developing the budget. The sequence of these steps may vary, depending on management style and other factors affecting the institution. In general, the issuance of budget guidelines comes from the top down; the preparation of budget requests for each budgetary unit, however, comes from the bottom up.

- Budget guidelines influence the preparation of the budget and indicate the institution's position on such items as salary and wage increases, and program priorities. The chief executive officer, other senior administrators, and the budget officer are usually involved in developing the budget guidelines; constituent groups may also be involved. Once guidelines are established, the budget officer is responsible for communicating them to the heads of budget units.

- Estimates of revenues from all sources should be based on all possible considerations (including past experience) and adjusted for probable conditions. In estimating expenditures, the general goals established in the long-range plan and the specific instructions of the chief executive officer for developing the budget should guide unit heads and others in preparing budget requests. The annual operating budget should also provide for contingencies.

- After the revenue has been estimated and expenditure guidelines have been determined, it is possible to provide the unit heads with a predetermined amount that their budget requests should not exceed. Internal budget hearings should then be held to review budget requests and special needs before the institutional budget is finalized.

- The preparation of unit budget requests normally involves the use of standardized forms. The content and arrangement of items in budget request forms are most useful if they follow the pattern of the budget itself and if the account classifications correspond to those in the accounting records and in internal and annual financial reports. Budget request forms and final budgets usually reflect the three major object classifications: personnel compensation, supplies and expenses, and capital expenditures. Supporting schedules prepared in developing the budget may assign amounts within major classifications for subordinate object categories. Budget forms should include columns of comparative figures for at least the preceding fiscal period and the budget year. [A sample budget form used at Ohio University was given as an example.]

- Presentation of the budget to the governing board or higher authority should include a comparison of the proposed budget with budgets of previous years, explanations of major changes, descriptions of programs added or terminated, and wage and salary policies. When the budget is approved, a copy of each unit's approved budget should be sent to the unit head. Copies of the approved budget should also be sent to appropriate administrative offices.

BUDGET TECHNIQUES

There are many budget techniques that can be employed to help facilitate and improve the budgeting process. Such techniques should be viewed as management tools. Below are descriptions of various techniques and of the advantages and disadvantages of each. These budget techniques, or a combination of them in a single budget cycle, are the ones most frequently used in developing institutional budgets. Regardless of the technique selected, the most important consideration is that it meet the management needs of the institution.

Incremental Budgeting

This is the most common form of budgeting. It assumes that the current basis for allocating resources is appropriate and that present programs are to be continued. Incremental increases are often tied to increases in inflation or changes in institutional rates or prices. During periods of fiscal stringency, however, budget items can be held at current levels or considered for a decrement (e.g., a 5% cut across the board).

Incremental budgeting is easy to understand and to prepare, and is widely accepted by governing boards or higher authorities. It does not, however, encourage an institution either to justify existing programs or to eliminate programs that are no longer needed, except in a limited way, through internal reallocations.

Open-ended Budgeting

This technique calls for institutional cost centres to submit budget requests at the level considered appropriate by the unit head. The central budget officer or a group of senior administrators then adjust the budget to meet resources (revenues). This adjustment usually takes place in negotiation sessions.

The advantage of this process is that there is a stronger link between the planning and budgeting activities of the units. The disadvantages include frequent incompatibility of budget requests with resources, and the need for several rounds of negotiations before the requests match resources.

Quota Budgeting

In this technique, institutional cost centres are given a control figure and then requested to build a budget based on this allotment. Control figures may be predicted on a percentage increase or decrease in current levels or on specific dollar amounts based on an analysis of current revenues.

The advantages of quota budgeting are that most centres can determine the total budget at an early date, and constituent groups are made aware of the overall budget picture as reflected in quota figures. The disadvantages are that there is a tendency to base the new budget almost entirely on the old one, and program review is not encouraged because quotas are often placed on line items rather than on programs.

Alternative-level Budgeting

This technique requires that several alternative budget levels (generally two or three) be prepared. For example, levels of 10% above the present budget level, 5% above the present level, and 3% below the present budget level may be designated by administrators.

Alternative-level budgeting provides a good method of obtaining details about program evaluation and the classification of program priorities. It also requires the judgment of persons at operating levels and forces administrators to be aware of program priorities. The disadvantages of this technique include the large amount of preparatory work required at various levels, and the uncertainty as to which level will be funded. Alternative-level budgeting also suffers from the same disadvantages as incremental and quota budgeting in that it reinforces the tendency to base the new budget almost entirely on budgets of previous years.

Formula-base Budgeting

This is a technique by which the financial needs or operating requirements of an institution may be determined by applying a formula. Formula budgeting is normally used in the U.S. on a statewide basis for state-supported institutions rather than as an internal budgeting procedure for individual institutions. (A state in the USA is similar to a province in China.)

An advantage of this technique is that it appears to provide equitable treatment among institutions. Furthermore, because formulas are quantitatively based, they may provide a rational and objective approach to resource allocation. Formula budgeting, however, is not a simple method of determining funding levels; formulas must often be refined or new ones developed.

In addition, actual appropriations can be considerably lower than the funding level determined by a formula.

Program Budgeting

This technique attempts to combine the planning and budgeting process by making planning objectives (outcomes) an integral part of an institution's operating budget.

The program budget attempts to clarify the resource requirements of various programs and to determine the cost of achieving given objectives. It further contributes to decision-making by providing an analysis of the anticipated costs and benefits associated with alternative program decisions. Some criticisms of program budgeting are that institutions have different interpretations of what constitutes a program and that it is difficult to establish specific outcomes for many programs that may have joint outcomes.

Zero-base Budgeting

This technique assumes nothing from previous budgets but starts from zero each year to build a new budget. Each budget unit (or "decision unit") is requested to evaluate its goals and objectives and to justify its activities in terms of both the benefits provided by the unit and the consequences of not providing services. This is accomplished by having each budget unit develop a series of decision packages. Each decision package describes an activity, function or goal of the unit and defines alternative service levels. These should include a minimum level of service (below which the unit would be unable to provide necessary services) and a maximum level (at which all of the unit's current and future activities are funded). When all of the decision packages have been developed, the unit manager ranks them in order of priority. Decision packages are then ranked centrally and decisions are made regarding the allocation of resources to each unit.

Because an institution cannot quickly or easily adjust its costs, some reductions or additions called for in zero-base budgeting cannot be made easily, and sometimes cannot be made at all. It may be difficult, for example, to relocate or lay off personnel in a short time. Fixed costs that have been financed over several years also make budget changes difficult in the short run. This kind of inflexibility impedes the adoption and strict implementation of zero-base budgeting, even though it has much to offer from a management point of view. Other disadvantages of this technique are the considerable time and paperwork required for its completion.

Performance Budgeting

This technique is somewhat similar to program budgeting but is based on the costs of performance and emphasizes the efficiency of operations. It requires the careful accumulation of quantitative data over time. Methods of cost-benefit analysis are used to measure performance and establish norms.

Performance budgeting has been criticized because economy takes precedence over service; it measures quantity rather than quality of service.

Planning Programing Budgeting System (PPBS)

This technique combines the best of both program budgeting and performance budgeting, and puts the emphasis on planning. It begins by establishing goals and objectives, just as in program budgeting, but includes the controlling aspect of measurement, which is paramount in performance budgeting. The steps important in PPBS are:

- Identifying the objectives;
- Presenting alternative ways to achieve those objectives, with cost-benefit ratios presented for each;
- Identifying the activities needed for each program; and
- Evaluating the result so that corrective actions can be taken.

In essence, PPBS combines the functions of planning (identifying objectives), translates these into a program (staff and materials), and finally states those requirements in budgetary terms (financing). Such an approach allows the unit heads and administrators to enumerate programs and assign costs to them. It also allows the higher authority to place programs into perspective and to evaluate the efforts of cutting monies from or adding monies to the budget.

BUDGET CONTROL

The principal purpose of budget control is to ensure that expenditures do not exceed allocations. The institutional budget officer or controller has responsibility for overall budget control within the institution, including calling attention to major departures from budget allocations and taking appropriate follow-up action. The unit head, however, has primary responsibility for the control of expenditures within the budget unit.

Budget Reports

Reporting is an effective means for budget control. Reports comparing actual results with budget projections should be prepared by the institutional budget officer at least monthly and sent to the individual budget units on a timely basis. Roughly each quarter, a report of operations and variance analysis should also be prepared. (Variance is defined as the difference between planned and actual performance.)

Budget Accounting

For institutions of any size, the utility of the budget as a management and control device is lost if budget controls do not appear as an integral part of accounting reports. The integration of budget control accounts with the accounting system brings under accounting control those records relating to revenues not yet realized and unexpended balances of budget allocations.

As a part of the budget system, provision must be made for outstanding obligations. There are various methods - from a detailed, central encumbrance system that is kept as a part of formal accounting records, to a decentralized, informal memorandum record of commitments kept by each budget unit.

In the accounting and budget control system, there may be records that should be kept locally, that is, at the point of use. In these cases, local records should correlate with, but not duplicate, centrally kept summary records.

Budget Revisions

The budget should be revised as needed so that it always represents an up-to-date estimate of revenues and a realistic plan for expenditures.

The assignment of responsibility, designation of authority, and procedures for budget revisions should be documented and then approved by the governing board or higher authority of the institution. The adopted policy should allow a high degree of flexibility at each level of authority consistent with appropriate administrative responsibility and approved policies and goals. Budget supplements and transfers should be in writing, with appropriate administrative approvals.

The integrity of the budget process requires that all foreseeable expenditures compete in the same process at the same time. To avoid circumventing the central budget process, budget requests that could have been anticipated in the original budget should be deferred, if possible, to the next budget cycle when they can compete with alternative resource needs.

POSTPERFORMANCE REVIEW

Postperformance review involves the critical analysis of a completed budget period and focuses on the following elements:

- Good planning and budgeting require that all variations between the budget and actual expenditures and revenues during the period be analyzed and that this analysis be used in developing subsequent budgets and plans.

- As part of the budget review, it is useful to examine the rationale underlying budget revisions during the period and to assess their effect on subsequent institutional plans and budgets.

- The review should attempt to ascertain whether the goals set for an institution and for each of its budget units were achieved during the budget period.

The results of the postperformance review should be summarized and presented to the chief executive officer and, ultimately, to the governing board.

REFERENCE

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INSTITUTIONAL MANAGEMENT:
STAFF (THE HUMAN ELEMENT)

STAFF DEVELOPMENT AND CONTINUING EDUCATION[1]

Hwa-Wei Lee

PURPOSE

Staff development and continuing education are important in improving the effectiveness and efficiency of any organization and in maintaining a high degree of adaptability. The quality of service in libraries and information centres is dependent on the skills, attitudes, and resourcefulness of the staff. Staff development and continuing education programs allow employees to acquire the competence needed to achieve and maintain quality service, as well as a sense of satisfaction with their work.

Definitions

"Staff development" is used to describe a broad range of activities that provides staff with the knowledge and skills that are directly related to their responsibilities in the organization. It includes (but is not limited to) orientation for new staff, on-the-job skill training, supervisory counseling, as well as seminars and workshops on topics as diverse as techniques of supervision, performance evaluation, communication, and the implementation of new cataloging rules. The responsibility for staff development rests with the organization. Barbara Conroy states that the purpose of staff development is to "prepare the individual and the library for the future, enabling each to contribute to the growth of the other" (Conroy 1978:xv).

The term "continuing education" is generally used to describe the process whereby library and information centre staff update their knowledge, broaden their scope or gain a more in-depth understanding of some aspect of their profession. Continuing education is also the means by which people seek the necessary competence to pursue a new career interest. Continuing education is focused on the needs of the individual rather than the needs of the organization; consequently, the individual is responsible for his/her own development and recognizes the need for lifelong learning to prevent obsolescence. Continuing education may consist of formal activities, such as academic course work, seminars, and conferences, as well as more individualized and informal activities, such as professional readings and research.

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[1] The major source used was Creth (1981).

STAFF DEVELOPMENT

Scope and Benefits

A program of staff development encompasses a range of learning activities, including:

- Those designed to teach specific skills, techniques, and procedures; and
- Those that provide employees with an understanding of the organizational objectives and the knowledge necessary to ensure effective performance.

A systematic and organized approach to the training and development of staff may provide the following benefits to the organization:

- An increase in the quality and quantity of work;
- Less need for close supervision, thus allowing supervisors to make more effective use of their time;
- Improved staff morale and job satisfaction by developing independent and competent employees; and
- Greater organizational flexibility and stability due to the fact that critical tasks can be assigned to other staff when there are staff absences or shortages.

Responsibility for Staff Development

Supervisor

The supervisor has primary responsibility for the development of staff. Evidence strongly indicates that for training to have optimum effectiveness it must be job-centred. The supervisor also most directly affects staff members' attitudes toward the job and the organization. The supervisor's views and opinions on the value of staff training and development will therefore make a difference as to whether employees feel encouraged to participate in such activities or become frustrated.

The supervisor's role in staff development begins when an employee is first hired. Some of the responsibilities of a supervisor include:

- Providing continual guidance and counseling to employees with regard to their overall job performance and potential;
- Developing written training plans for initial orientation and training;
- Encouraging employees to evaluate their training;
- Providing opportunities for employees to assume greater responsibility and to participate in different activities that test their acquired knowledge and skills;
- Discussing with employees how they might improve their performance through formal learning activities, as well as personal efforts outside of structured activities;
- Inviting employees' comments and suggestions regarding the supervisor's communication and leadership style; and
- Ensuring that employees understand not only how a task is accomplished, but why it is important to the operation of the organization.

Chief administrator

A major key to the success of a staff development program is the leadership, support, and commitment provided by the chief administrator of the organization.

Personnel officer

As a member of the administration, the personnel officer is responsible for the overall planning and implementation of an effective staff development program. The personnel officer should exercise his/her leadership and expertise in establishing sound direction and a positive climate for staff development. Among the responsibilities of the personnel officer are:

- Identifying staff development needs;
- Implementing and coordinating organization-wide activities, such as orientation, workshops and seminars;
- Establishing relevant policies and procedures;
- Ensuring the evaluation of activities and the overall program;
- Providing guidance and assistance to supervisors as they plan and develop orientation and training activities within their departments;
- Directing the development of in-house training materials; and
- Serving as a resource person on questions related to staff development.

Staff development committee

Such a committee can play a vital role in establishing and maintaining a staff development program. It can provide valuable assistance and advice to the personnel officer in a number of functions, such as:

- Identifying staff development needs;

- Coordinating and assisting with the orientation program, as well as certain training activities;

- Assisting with the preparation of training and orientation materials;

- Advising on staff development policies and procedures; and

- Providing another communication channel between the staff and the administration regarding staff development.

Staff

All staff members in an organization also have a central role in staff development: without their recognizing the importance of continuing growth and development, no learning activities can be effective.

Staff Development Activities

A well-balanced staff development program includes a range of formal and informal activities that focus on three areas:

- Orientation,

- Skills and techniques training, and

- Developmental activities.

Formal activities

Formal activities follow a specific plan and structure.

The purpose of orientation is to familiarize employees with basic information and routines regarding:

- The specific job and work environment,

- The organization, and

- The parent institution.

The orientation to the specific job and work environment is often conducted by the immediate supervisor according to guidelines established by the personnel officer or the staff development committee. An "orientation checklist" can be used to ensure that all essential points have been covered. [This was illustrated by slides.]

Training encompasses activities that are designed to provide employees with the knowledge, skills, and attitudes necessary to perform their responsibilities effectively. As Martell and Dougherty point out, "training is the very core of most staff development programs. Indeed training has been and remains a key organizational mechanism of reconciling the ability of the individual with the needs of the organization" (Martell and Dougherty 1978:153).

Three types of on-the-job training are normally found:

- Training for new employees,
- Training on new skills and techniques, and
- Training to upgrade certain skills.

Most of this training occurs within a department under the direction of the supervisor; there may also, however, be workshops or group training sessions for employees who come from several different departments but who must learn the same skills and techniques.

A systematic approach to training is much more likely to produce a high level of performance and a positive attitude than one that is poorly planned and implemented. Consequently, a plan that outlines a logical sequence of activities should be drawn up before training begins.

Developmental activities are broader in scope and content than training activities and generally deal with concepts and practices rather than with specific technical or operational skills. Examples of developmental activities are:

- Management training,
- Introduction to statistics and research methods,
- Computer applications, and
- How to conduct a performance evaluation.

Developmental activities are often planned or coordinated by the personnel officer with the advice and assistance of the staff development committee. Outside experts may be called upon to conduct workshops or group sessions of this kind.

Informal activities

Informal activities have no definite structure but nonetheless contribute to an employee's development. Examples of these include:

- Discussions with co-workers about job functions,
- Discussions with the supervisor regarding performance strengths and weaknesses, and
- Personal reading and research.

Staff Development Materials

The training process in many areas of library and information service is highly repetitive. Because one-to-one staff training is expensive and time-consuming, new approaches to training, such as programed instruction or computer-assisted self-instructional materials, should be developed.

Both audiovisual aids (slides/tape, filmstrip, video) and written aids (programed or self-instructional) can be considered for use in training materials. The appropriate formats and techniques should be determined by the subject or skill to be taught, as well as by the audience. Materials can be developed in segments or modules to allow the instructor to make brief, focused presentations, and to allow employees to learn or review a small portion of information at a time.

The Planning Process

There are several key components to the planning process for staff development:

- Defining the scope and function of the program, including the establishment of program goals and objectives;
- Identifying training and developmental needs for all categories and levels of staff by means of a carefully conducted need assessment;
- Setting priorities for the staff development program;
- Identifying the resources necessary to support the program; and
- Evaluating the program in order to improve it.

CONTINUING EDUCATION

Scope and Benefits

Continuing education activities typically include:

- Formal course work (both degree and nondegree programs, including regular and correspondence education);
- Attending workshops, seminars, and conferences;
- Research leave; and
- Job exchange or internships at another institution.

Although continuing education is broader in scope than staff development and is focused on the needs of the individual rather than the needs of the organization, it deserves support and encouragement: staff actively involved in such learning and development will contribute to the vitality of the organization.

Support for Continuing Education

Continuing education, although somewhat distinct from staff development, should be viewed as complementary to it. As such, the manner and extent of the organization's support of continuing education should be made clear, as should the supervisors' role in providing support and direction to employees.

The organization's support of continuing education indicates to employees that learning and development are lifetime endeavours and that the organization needs people who demonstrate the capacity for continued growth and development.

For the many libraries and information centres in developing countries where staff training is inadequate, the need for continuing education of all kinds is of great urgency. The appropriate government agencies, library and information associations, library schools, and national and provincial libraries in these countries should plan and organize large-scale continuing education programs to upgrade the knowledge and skills of library and information centre staff in their respective geographical areas. Opportunities for continuing education abroad should also be considered for selected key staff.

Continuing Education Opportunities in Canada and the USA

The lecture concluded with a discussion of library school programs and continuing education opportunities available and suitable for Chinese librarians and information scientists in Canada and the U.S.

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TRAINING FOR PROFESSIONAL STAFF

M. Beckman

REVIEW OF DIFFERENT PROFESSIONAL CATEGORIES WITHIN AN INFORMATION CENTRE

As was illustrated in a previous session, a variety of professional work is performed in an information centre. The variety is more pronounced in an information centre than in a traditional library because of the need for specialists in the discipline of the parent organization. For instance, a company specializing in polymer processes might well expect the information centre to have at least one professional with an advanced degree in polymer chemistry or chemical engineering. University libraries would tend to require a double degree (in polymer chemistry and information science), but specialized information centres tend to separate what is considered traditional library work - the acquisition and organization of information - from the analysis and synthesis of the information contained in the documents.

A medium-sized information centre may well have several categories of professional staff. A larger information centre might have one or two extra levels for each category - librarian or specialist. A total hierarchy for jobs in an information centre can then be established. [Examples were given of this.]

NORTH AMERICAN TRAINING FOR INFORMATION SPECIALISTS

A brief overview of the training program for information scientists in North America may be useful at this time. The first professional school for the education of librarians ("librarian" being the only term used at that time) was the School of Library Economy, which was started by Melvil Dewey at Columbia College in 1884. Because one library school was not adequate, by 1900 many large public libraries developed training classes as a means of training staff. These classes lasted about 9 months, with formal classes in the morning and work sessions in the library in the afternoon. Qualification for admission was a high school certificate.

By the 1920s and 1930s, library professionals realized that this was an insufficient background for the increasingly complex activities in a library, and felt that a broad education in the liberal arts should be the basis for library training. Training programs were moved from the public libraries to academic institutions and the entrance requirements were raised so that a bachelor's degree was required. Essentially, library education became a 5th year of study beyond high school and provided a second bachelor's degree - BSLS, BLS, or BALS.

In the late 1940s, this 5th year was upgraded at American universities to a master's degree (MSLS, MLS, or MALS), but it was basically the same program. In the Canadian library schools a slightly different pattern emerged in that 2 years or four semesters of study beyond the bachelor's degree was required for a master's degree in library or information science. Several American schools are now recognizing that there is so much to be covered in a library/information science curriculum that 1 year or two semesters is not really sufficient, and a 6th year master's degree is now an option. In Canada, it is the basic minimum.

Another recent development is the doctoral degree for advanced specialist training. Not all library schools offer this degree - in Canada only two of the seven schools do - and it is usually taken by people who want to teach in a library school or become directors of a large academic research library. This program normally requires an additional 2 years of course work plus a thesis.

Another tendency in the past decade, particularly in research university libraries or in scientific organizations, is to require specialist training in a discipline at the graduate level, e.g., an MSc in chemistry, or computer science, as well as a master's degree in library or information science. This background is more useful than a doctorate in library/information science for all but senior academic positions.

To maintain equivalencies among library schools in North America, the American Library Association is authorized to accredit library science programs leading to the first professional degree in both Canada and the United States. About 70 schools are accredited in the two countries. Although they do not offer identical curricula, all accredited schools should theoretically offer programs that present the principles and procedures common to all types of libraries and library services.

CURRICULUM

The curriculum at a library information science school includes core (or required) courses, elective, and special courses.

Core Courses

The core courses cover all aspects of the field of library or information science that every graduate of the program should be familiar with. Some schools provide more emphasis on newer technologies than do others, and have more than one core course related to some aspect of automation. A student interested in that aspect of information science should choose a school with that emphasis.

The following are typical core courses.

- Bibliographic Control: Cataloging and Classification. The theory and practice of cataloging and classification.

- Information Sources and Services. Theory and practice in the development and use of basic information and reference resources. Study or reference services, including computer-based information services, and the relation between resources in the field and the needs of users of libraries and information centres.

- Research Methods. The concepts, methods and practice of research appropriate to library and information science. The nature, practice and uses of research. Evidence. Tools for research. Analysis and interpretation of findings. Documentation and preservation of results.

- Bibliographic Control: Indexing. Subject control of information. The principles of indexing, classification, and abstracting systems, and practice in their use: indexing vocabularies, automatic and computer-aided indexing, string indexing languages, and abstracting and extracting methods.

- Collection Development. Theory and practice in the selection and evaluation of materials for library and information centre collections. Problems in improving the building and use of collections. Relation between the variety of materials available and the needs of library users.

- Quantitative Methods. Quantitative methods that have application to information retrieval and to library/information centre problem-solving, decision-making and evaluation. The role of the computer in implementing these techniques.

- Administration. Principles of administration as practised in libraries and information centres. Relation of the library/information centre to its community and to other organizations, both governmental and private. The library/information centre as a part of local, regional, national and international networks.

- Systems Analysis. Applicability of systems concepts to library systems and information retrieval systems. Introduction to computer hardware and software and to information processing by computer. Use of the computer as a tool for implementing systems and for the study of information-handling problems.

Elective Courses

Elective courses provide a wide variety of options that relate to the special field of interest or type of library/information centre in which the student hopes to work. The following are typical of such courses.

- Academic Libraries. The influence of higher education on the use of library resources. The relationship between the philosophy, curriculum and organization of academic institutions and the collections and services of the library. The academic library and its relations with its own users and the wider community.

- Advanced Information Services. Further study of topics dealt with in "Information Sources and Services". The administrative aspects of providing reference and information services, and of using on-line bibliographic searching. Techniques of query handling and literature searching, evaluation and measurement of reference services and referral services. The training of reference personnel.

- Art Libraries and Information. Special problems of cataloging and classification, reference, and the acquisition of different materials handled in art libraries, the special characteristics of those materials, and their relation to the planning, administration and services of art libraries.

- Bibliography and Librarianship. The needs, both past and present, that bibliographers have attempted to satisfy, and the methods used to this end. The relationship between bibliographies and catalogs (including library catalogs). The relationship between bibliography of all kinds and librarianship.

- Book Collecting and Librarianship. Book collecting and the development of great collections, from a historical perspective. The reciprocal relationship between book dealers and librarians/collectors.

- Canadiana. The range and extent of Canadiana. Existing bibliographic resources and future needs. Acquisition programs for different types of libraries, based on problems investigated in specific institutions. The history and present state of Canadian publishing and the Canadian Copyright Law.

- Cataloging Theory and Practice. The principles guiding catalog code design, examined critically from a historical as well as modern perspective. The impact of computerization, networking, and international standardization on the design of the bibliographic record and authority record files and on the organization of technical services departments. Practice in cataloging, especially in relation to changes in international cataloging standards.

- Comparative Librarianship. Comparative methods of studying librarianship. Factors that affect the theory and practice of librarianship in various countries and regions.

- Computerized Files and Applications. Data structures and file organizations represented in the information field. Computerized library procedures and common programing techniques as practiced in actual library environments.

- Conservation and Preservation in Archives. An evaluation of modern conservation techniques. Materials used in the production of archival records; the physical conditions needed for proper preservation and security of those records. The role of the professional conservator, and the problems of ensuring durability and permanence when dealing with archival materials.

- Contemporary Children's Literature. Characteristics of 20th century publications for children. The relationship between published literature read by children and the psychology of the child. An evaluation of representative current titles.

- Design and Evaluation of Indexing Systems. A survey of a variety of indexing systems, both actual and suggested. Theories underlying the design, implementation and evaluation of original indexing systems.

- *History of Children's Literature*. A historical survey of literature for children: a study of the world of childhood through the books they enjoy and an evaluation of literature for children.

- *Development of Libraries and Librarianship*. Factors that have affected library development in the New World and the part played by libraries in its intellectual history. An analysis of the impact of the Old World heritage in the shaping of a New World tradition. The influence of New World trends and accomplishments on recent developments in other countries.

- *Development of Libraries and Librarianship: Old World*. The forces that have shaped [illegible] development of libraries and the philosophy of librarianship from ancient times to the present. The principles of historical scholarship. Foundations for a philosophy of librarianship, based upon the study of library history.

- *Government Documents*. The nature, extent, variety and value of government publications; methods of handling them (their selection, acquisition, organization and use) in libraries and information centres. The complexities of the organization and function of governmental and intergovernmental bodies, and their effect on the production and distribution of government publications.

- *Health Sciences Libraries*. The information needs of the medical and allied professions, and ways of providing them with library and information services.

- *Information Resources in the Health Sciences*. The organization and subject content of the literature used by the medical and allied professions, and its historical development.

- *Information Resources in Languages Other than English*. National, cultural and linguistic differences in the organization and retrieval of information. The application of knowledge of language families, scripts, alphabets and transliteration schemes to library reference and acquisition tools.

- Information Sources and Services in the Humanities. The nature of the humanities, and the organization of the literature. The information needs of researchers and practitioners in the humanities, and their use of information. An evaluation of the effectiveness of library and information services in meeting these special needs.

- Information Sources and Services in Science and Technology. The nature of the sciences and technology, and the organization of scientific and technical research. The information needs of researchers and practitioners in science and technology, and their use of information. Specialized forms of literature and information in science and technology. The organization of library and information services and their evaluation.

- Interpersonal Communication. The principles of effective interpersonal communication, with emphasis on practice in a library context, such as personnel and reference interviews, running meetings, signage, and report writing.

- Introduction to Archives Administration. A survey of the historical evolution of the agencies and institutions responsible for preserving archival records. A comparison of the principles of archival science and similar disciplines. The use of archival records, their management, and physical housing and organization.

- Law Libraries and Legal Information. The characteristics and needs of users of legal information. Law libraries and other resource centres providing legal information. The organization of legal materials. Sources of legal information and their use. The role of the librarian in disseminating legal information.

- Library Materials and Services to Young Adults. The characteristics and range of library materials appropriate for young adults. The relationship between library materials used by young adults and the psychology of young adults. Analysis of the young adult community and the library services it requires. A critical examination of the goals of libraries providing such services. The personal and professional qualities required for serving the needs of young adults.

- Library Planning. The principles of library design. The identification of elements in library architecture and their governing factors. The relationship between design and function. The areas of responsibility assigned to each professional concerned. The relationship between the library building and the physical environment. The relationship between library services and the community served.

- Master's Seminar. The philosophy of librarianship. A review of and reflection upon the principles derived from other courses in the program. An examination of selected important issues in librarianship. The development of practices and thinking that will lead to continued intellectual and professional growth.

- Music Libraries and Information. Special problems of cataloging and classification, reference, and the acquisition of different materials handled in music libraries, the special characteristics of those materials, and their relation to the planning, administration and services of music libraries.

- Nonprint Media Collections. Principles and practice in the selection, evaluation and bibliographic control of nonprint materials in library and information centre collections. Problems in the building, use and control of nonprint media collections.

- Operational Research in Library and Information Science. The techniques of operational research commonly used in the analysis of library and information systems. A critical evaluation of current literature in the field.

- Problems in the Organization of Information.

Selected problems in cataloging, classification and indexing, with the library of the School of Library and Information Science, University of Western Ontario, as a laboratory.

- The Public Library in the Community. Community analysis. The role of the public library in relation to other community institutions and resources. The image of the public library in the community. Characteristics of users and nonusers. Public library services for the adult independent learner. The development of support to enable the library to respond to changing community needs.

- Public Library Services to People with Special Needs. The development of an awareness and understanding of people who, because of economic, physical or cultural circumstances, are prevented from using traditional public library services. The role of the public library in serving these populations. The development of methods of working with such groups as the aged, the disabled and cultural minorities. A critical analysis of the impact of special needs on collection development, information services, facilities, personnel, and program planning.

- Records Management. The nature and role of records management as an aspect of information work that is concerned with the control of recorded information required in the operation of an organization's business. Principles and techniques involved in developing and implementing an effective records management program.

- Research in Canadian Library History. Research into an aspect of Canadian history on the local, provincial or national level. A survey of the history and development of Canadian libraries. The placing of Canadian libraries in their social and cultural context.

- Research Principles and Practice in the Humanities. The use of evidence in research conducted by scholars in the humanities; methods of finding, recording and interpreting such evidence. The use of primary and secondary sources for bibliographic, biographic and historical research. Special collections and their services.

- Research Principles and Practice in Science and Technology. The principles of scientific research and criteria for evaluating the results of such research. Services to library users who are engaged in research or who apply research in the field of science and technology.

- Research Principles and Practice in the Social Sciences. The principles of social scientific research and criteria for evaluating the results of such research. Services to library users who are engaged in research or who apply research in the field of the social sciences.

- School Libraries. An introduction to the purpose and function of the school library in education. Particular emphasis will be given to current educational trends, and the role of the school librarian and the library in relation to their particular users.

- Selected Problems in School Libraries. Some of the special problems involved in the operation and administration of the school library, with special emphasis on the application of research to problem solving.

- Serial Literature. Principles and current practices in the selection, acquisition and bibliographic control of publications in serial form, and methods of gaining access to material contained in them.

- Services to Children. Analysis of the child community and the library services it requires; the goals of libraries providing such services. Research findings, theories, and established patterns of communicating recorded knowledge to children. Personal and professional qualities needed for serving the needs of children.

- Slavic Libraries and Librarianship. Publications and library development in Slavic language countries.

The development of Slavic studies in Europe and North America. The availability of research material for Slavic studies in library collections in Canada, the USA, the USSR and European countries.

- Social Information. An analysis of existing centres of information dissemination and their organizations as channels of social information. The relationship between social information, social epistemology and the sociology of knowledge.

- Special Libraries. An analysis of the characteristics of communities served by various special libraries, and of the diversity of goals, status, collections, organization, service and size of special libraries. A comparison of special and other libraries regarding materials, methods of access, and range of services. The personal and professional qualities required for the effective direction of a special library.

- Theory of Administration.

- Theory of Classification. The principles of classification, both as manifestations of psychological and intellectual behaviour and as applied in various systems for organizing materials and knowledge. The problems in applying those principles in library and information systems. The history, present trends and future possibilities of classificatory methods of indexing and retrieving information.

- Theory of Information Retrieval and the Testing of Systems. The principles upon which various retrieval methods are based; their origins and validity. Methods of evaluating information retrieval systems and their relationship to such theories as probability theory and decision theory. Attempts to improve information retrieval methods, with special attention to the value of logic and linguistics, and future possibilities for research.

- Information Media. The role of the medium of communication in information work. Communications technology, including practice in the operation of selected technologies. Future trends and their impact on library and information science.

- Information Services for Business and Industry. The information requirements of the business and industry environment and ways of providing library and information services in that environment, including subject analysis, numeric on-line data bases, and current awareness services.

OTHER PROGRAMS

The program for professional qualifications in Europe used to be different from that in North America. A librarian's training was viewed as that of a technician, with students working as apprentices and then writing a series of qualifying exams, having entered the program after secondary school. The diploma in England, Scotland, Ireland and all the British Commonwealth countries except Canada was called the Associate of the Library Association (ALA). One could acquire a Fellowship (FLA) if one had a university degree and had written the qualifying exams; in North America, the FLA degree was the equivalent of an MLS.

In the past 10 years, however, England has phased out the ALA program, and several universities now offer graduate courses in library or information science. A similar movement is occurring in other European countries, particularly in Scandinavia.

TRAINING OF OTHER PROFESSIONALS

As has been indicated, more than library and information science professionals are needed in today's information centre. The so-called professional specialists that are required are usually of three kinds:

- Those associated with some specialized aspect of management (e.g., personnel or business officers);

- Those associated with automation or communications technologies (e.g., systems analysts); and

- Those associated with the particular scientific discipline of the parent organization (e.g., chemical engineer information specialists).

Needless to say, there is no specific training for these professionals. Business or personnel officers may have a degree in business or personnel administration plus considerable experience. Systems analysts would probably need a master's degree in computer science. Information specialists would need a degree in the discipline of the parent organization. At the senior level, they are usually trained and experienced scientists who choose to work with information because they are interested in that aspect of the discipline and want to learn more than they can in the research laboratory. They speak the language of their laboratory colleagues but can also make themselves understood by nonscientists. They are able to see all sides of a problem and to relate their knowledge of the discipline to the techniques of information finding.

Training on the job is more important for these other professionals than for professional library/information scientists because they must acquire the theoretical background that the latter receive in library school. In North America, it is not unusual for a professional librarian after several years in a library to enrol in either a full-time or part-time program of continuing education to acquire additional qualifications in a specialized field. For example, many librarians are now acquiring additional degrees in business, personnel administration or in computer science to qualify for specialist jobs within the library structure.

TRAINING FOR MANAGEMENT

Management cannot be divorced from the individual who performs the job: it is therefore difficult to define exactly the best training for management. As was illustrated in the typical curriculum of a library school, several courses in management are offered, and certainly should be taken by all professional library/information scientists, regardless of whether they are going to pursue management careers. But it is effective training on the job, as well as appropriate personal characteristics, that makes a successful manager. In a specialized information centre, a successful manager must have a combination of technological expertise and administrative effectiveness. He/she might thus have a background in a specific discipline, a library or information science education, and an accumulation of management experience and insights. Three particular skills are required:

- Management of information systems;
- Understanding of technical operations; and
- Substantive knowledge of science and technology.

Although on-the-job experience has been considered the best way to develop management qualifications, there is now a trend toward taking short courses for specific training in management. Two-week and six-week institutes for candidates in middle to senior management positions are now offered at several universities in Canada, the United States and the United Kingdom. The emphasis in these institutes is on organization theory and organizational processes, the human dimension of organizations, and managerial problems related to innovation and change. Topics include theories of administration and management; problem solving; leadership, motivation and communication; formulation of objectives; personnel relations; financial planning and control; and performance appraisal. Courses are often taught using role playing or seminar techniques.

PERFORMANCE EVALUATION[1]

Hwa-Wei Lee

PURPOSE OF PERFORMANCE EVALUATION

Performance evaluation may serve many purposes. Its primary objective, however, is to improve organizational effectiveness through better utilization of human resources.

Performance evaluation occurs in an organization whether or not there is a formal evaluation program. Employers constantly observe the manner in which employees carry out their assignments, and then form impressions as to their relative worth. Many of the larger organizations, however, have developed a formal program that is designed to facilitate and standardize the evaluation of employees.

The success or failure of a performance evaluation program is dependent upon its underlying philosophy, the attitudes of management and supervisory personnel toward the program, and their skills in achieving its objectives.

Some of the obvious reasons for conducting performance evaluation are:

- To establish better communication between supervisors and their subordinates on a regular and continuing basis;
- To help improve the performance and professional development of each employee;

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[1] Major source consulted was Chruden and Sherman (1972: 264-291).

- To provide a basis for personnel actions such as promotion, reclassification, transfer, salary increase, probation, dismissal, etc;

- To assist employees in establishing individual goals, objectives and action plans within the context of unit and institutional goals and objectives; and

- To increase the awareness of supervisors in regard to their employees' satisfaction with their jobs, the institution and the working environment, which may lead to improvement at the higher levels.

THE EVALUATION PROCESS

Most formal evaluation programs have clearly stated objectives and a well-organized system for attaining those objectives. The steps involved in such a system are shown in Fig. 1 and are taken from a pamphlet prepared for the supervisory personnel in the U.S. Veterans Administration (n.d.). It is essential in such a system to prepare statements of performance requirements that subordinates are expected to meet. These statements should be discussed with subordinates and used as a basis for evaluating performance. Managers and supervisors should also have the ability to evaluate performance as objectively as possible, to discuss the evaluation with the employees, and to take appropriate action.

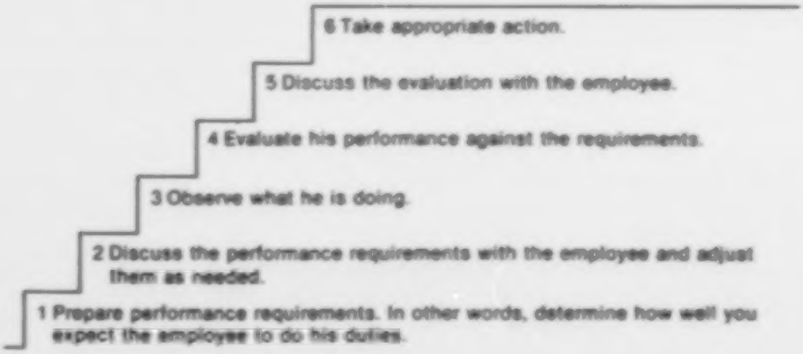
6 Take appropriate action.
5 Discuss the evaluation with the employee.
4 Evaluate his performance against the requirements.
3 Observe what he is doing.
2 Discuss the performance requirements with the employee and adjust them as needed.
1 Prepare performance requirements. In other words, determine how well you expect the employee to do his duties.

Fig. 1. Steps in a performance evaluation program.

Studies (NICB 1965) have shown that about two-thirds of the companies surveyed, including both manufacturing and nonmanufacturing, have programs for individual performance evaluation. Such programs are reported to serve many purposes: helping the supervisor get to know employees, advising employees of their progress, training and development, research, and such personnel actions as salary determination, promotion, transfer, discharge and layoff. Table 1 summarizes the findings of the studies in which 67% of the companies in both groups had individual performance evaluation programs.

Table 1. Performance evaluation practices (NICB 1965).

	Office personnel practices: Nonmanufacturing (529 companies)	Personnel practices in factory and office: Manufacturing (426 companies)		
		Blue- and white-collar employees	White-collar employees	Blue-collar employees
Reason for rating job performance[a]				
Salary determination	89%	69%	90%	76%
Promotion	85	73	80	59
Help supervisor know employees	64	61	65	41
Let employee know his/her progress	66	61	74	24
Training and development	72	61	70	41
Transfers	71	59	58	41
Basis for follow-up interview	47	34	49	29
Discharge	54	46	38	6

Personnel research	23	29	27	18
Layoff	25	27	25	24
Supervisor discusses rating with employee	71	56	71	59
How employees are rated:				
Mostly on job performance	55	55	68	58
About half job performance and half personality characteristics	45	45	32	42

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[a] Some companies selected more than one reason.

Performance evaluation is an ongoing and continuous program. It should be placed under the administrative control of the personnel officer or a senior administrative officer who is responsible for personnel matters. The details of the program should be written into the policy and procedures manual or personnel handbook of the institution and be communicated to all staff members. The policy and procedure should be reviewed periodically, and all staff members, including both supervisors and employees, should be invited to participate.

Special training programs on how to conduct performance evaluation should be offered to supervisors.

Normally, performance evaluation is done yearly, either on the date on which an employee was hired or during the same period for everyone. For new employees or others who require special attention, there may be a shorter performance evaluation cycle, ranging from 1 to 6 months.

PERFORMANCE EVALUATION METHODS

Traditional Methods

The older methods of evaluation usually attempted to quantify behaviour or traits that were deemed to be important measures of an employee's worth to the organization.

Graphic rating scale method

This is the most commonly used type of rating scale. Each trait or characteristic is represented by a line or scale on which the rater indicates the degree to which he/she believes the employee possesses that trait. [An example of this type of scale was given and a graphic rating scale, with provision for rater comments, used by Ohio University Libraries was illustrated.]

The provision for rater comments found on most graphic rating scales is useful in that it allows the supervisor to "back up" a rating with facts and therefore reduces the "halo error". This error results from the evaluator rating an employee according to his/her likes or dislikes: it is a form of prejudice or bias that prevents the evaluator from perceiving the behaviour of another person accurately.

Other traditional methods

Other traditional methods include:

- The checklist method, in which the rater checks the statements on a list that he/she feels are characteristic of the employee's performance or behaviour.
- The method of paired comparisons, which involves comparing each individual with all of the others in the group; and
- The ranking method, which requires the rater to rank employees from the best to the poorest.

Newer Methods

While the more traditional methods of evaluation are still being used, there are newer approaches that have become increasingly popular. They are frequently used in conjunction with the more traditional methods.

Forced-choice method

The forced-choice rating scale requires the rater to indicate by a check mark those statements that best describe the individual being rated. Each forced-choice scale is made up of groups of four statements, known as "tetrads". The following is an example:

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(1) Able to handle emergency assignments
(2) Hesitates to offer new ideas
(3) Definite in goals
(4) Gets confused under pressure

The rater is presented with a list of such tetrads and is instructed to indicate in each the one statement that is most descriptive and the one statement that is least descriptive of the individual being rated. In the above tetrad, Statements 1 and 3 describe equally desirable qualities, and Statements 2 and 4 equally undesirable qualities; in each case, therefore, the rater will choose one of the two statements because it is descriptive of the individual and not because it sounds a little better or worse than the other statement. Thus, the extent to which bias may influence the rating is minimized. The forced-choice method has been found to correlate more highly with productivity than with subjective factors.

The primary limitation of the forced-choice method is the cost of establishing and maintaining its validity.

Critical incident method

This method involves spotting critical incidents of employee performance, classifying the incidents according to the headings given in the record sheet maintained on each employee, and recording them

(Flanagan and Miller 1955). Before every performance review, the detailed entries under the major headings are summarized and space is provided under each heading on the performance record form for recording the "favourable" incidents and the "unfavourable" incidents.

This method emphasizes the importance of recording both strengths and weaknesses in specifically categorized areas. It is potentially one of the most effective evaluation methods because it provides concrete information that can and should be discussed with the employee, preferably at the time of the incident. If, however, the supervisor merely records incidents and does not discuss them with the employee, or waits several months to do so, this method may be viewed by subordinates as the "little black book" approach to personnel evaluation.

Field-review method

This method derives its name from the fact that a representative of the personnel office goes into the "field" (i.e., the workplace of the supervisor) to obtain information about the work of individual employees. The personnel officer asks the supervisor detailed questions about each employee's performance and later prepares the evaluation reports. The reports are then sent to the supervisor for revision, if necessary, and for approval.

Group-appraisal method

Like the field-review method, the group-appraisal method provides for personnel to participate in the evaluation. A group of managers who know the employee (including the immediate supervisor and his/her superior) confer with a coordinator whose primary role is to keep the evaluation objective. They discuss the evaluation that was previously prepared by the supervisor after a discussion with the employee as to the job requirements. Following the conference, the supervisor has another discussion with the employee about such things as standards of performance, the employee's performance, and any development action required to improve performance. The group-appraisal method is valuable in organizations with more than one line of authority or in cases where an employee does not feel that his/her evaluation was done objectively by the supervisor.

Peer-rating method.

This method has been used extensively in the military forces in the U.S. Research indicates that employing this method need not result in popularity contests and that, if a peer group has sufficient interaction and is reasonably stable over a period of time, the ratings are reliable (consistent) and agree closely with ratings made by supervisors (Booker and Miller 1966). The advantage of peer ratings is that peers may view behaviour that is not seen by supervisors. In addition, where several individuals appear to be equally qualified to fill a leadership position, the organization might benefit from selecting the person who is seen by his/her peers as having the highest informal leadership status.

MANAGEMENT BY OBJECTIVES (MBO)

This widely accepted management system (Odiorne 1965) has placed considerable emphasis upon performance evaluation since it was first popularized by Drucker (1954) and McGregor (1957).

A significant feature of the MBO cycle is the establishment of an individual's goals by himself or herself, using a broad statement of responsibilities prepared by the superior. The goals or targets are accompanied by a detailed account of the actions he/she proposes to take to reach them. This document is then discussed with the supervisor and modified until both are satisfied with it. Progress that the subordinate is making toward the goals is assessed as objective data are made available. After a certain length of time (usually 6 months), the subordinate appraises his accomplishments relative to the targets, using objective facts whenever possible. The "interview" is an examination of the subordinate's self-appraisal by both the supervisor and the subordinate.

Advantages of MBO

The advantages of the MBO system include the following:

- MBO shifts the emphasis from appraisal to self-analysis and from focus on the past to the future.

- Through consultations with supervisors, subordinates are assisted in relating their career planning to the needs and realities of the organization.

- When properly conducted, these consultations strengthen the supervisor-subordinate relationship and encourage supervisors to help their subordinates reach their targets.

- It enables subordinates to feel a sense of accomplishment and progress because their performance is compared to their own objectives rather than the performance of their peers. (Other appraisal systems in which individuals are compared to each other may enable only a few to have feelings of improvement.)

- MBO also allows both the supervisor and the subordinate greater flexibility in setting goals and in making changes necessary to achieve these goals.

- Kindall and Gatza believe that this type of approach tends to help people set targets that are both challenging and more realistic, provides a method of detecting training needs, and treats as a total process a person's ability to see an organizational problem, to devise ways of attacking it, and to translate ideas into action (Kindall and Gatza 1963).

Criticisms of MBO

MBO is not without its critics. Some of the pitfalls in this method as pointed out by Coleman (1965) and Levinson (1970) are:

- It leads many managers to assume that there is less need for them to counsel employees because the figures give employees a running check on how they have done.

- The performance data used in the results-centred appraisals are designed to measure end results on a short-term rather than a long-term basis. Thus, a line supervisor may let the machines suffer to reduce maintenance costs.
- The method does not eliminate the personal idiosyncracies that shape each manager's dealings with subordinates.
- It may be questioned whether a greater understanding really does develop between supervisors and subordinates.

EVALUATION INTERVIEWS

The primary purpose of an evaluation interview is to make plans for further development. It is a very important part of the performance evaluation for the following reasons:

- It provides an ideal opportunity to explore with the employee his/her present performance and areas of possible improvement.
- It provides an opportunity to identify and understand the employee's feelings and attitudes more thoroughly.
- It may improve communication between the supervisor and the employee and result in a feeling of great harmony and cooperation.

Guidelines for Evaluation Interview

In making plans for an evaluation interview, several guidelines developed by the General Electric Company are suggested (Kellogg 1961):

- Make specific and concrete plans: where possible, show desirable timing;
- Emphasize the strengths that employees can use more

effectively, rather than the weaknesses they should overcome;

- Avoid suggestions that involve changing personal characteristics; instead, describe behaviour that has hurt the individual in certain situations and suggest other more acceptable ways of acting;
- Concentrate on the opportunities for growth that exist within the framework of the individual's present position, recognizing that advancement generally stems from outstanding contribution on assigned responsibilities;
- Limit plans for growth to a few important items that can be accomplished within a reasonable length of time; and
- Focus the plans on a specific objective (e.g., to increase effectiveness as an indexer or a systems analyst), rather than on general improvement.

Although the above approach is certainly positive in nature, it does not suggest that all unpleasantness be avoided. If criticism is expressed tactfully and constructively, it should not be omitted for fear that it will cause "hurt feelings".

The supervisor should not do all of the talking, but should encourage employees to express their opinions and feelings as fully as necessary to achieve effective communication.

Interviewing Approaches

The key to successful interviewing lies in a versatile and flexible approach which considers:

- Overall purposes of the evaluation,
- Method of evaluation that is used,
- Type of personnel (professional, clerical, etc.), and
- Specific requirements of each person being evaluated.

There are various types of interviewing (Maier 1958):

- The tell-and-sell type is intended to persuade the subordinate to change in the prescribed manner.

- The tell-and-listen type is intended to communicate the strong and weak points of a subordinate's job performance during the first part of the interview and then to thoroughly explore his/her feelings about the evaluation in the second part of the interview.

- The problem-solving type attempts to stimulate growth and development in subordinates by discussing the problems, needs, innovations, satisfactions and dissatisfactions they have encountered in the performance of their job.

The cause-and-effect relations in the three types of evaluation interviews were discussed. The problem-solving type is recommended because the objective of evaluation should be to stimulate the growth and development of the employee. Training programs on interviewing skills should be offered regularly to supervisors.

FOLLOW-THROUGH

Performance evaluation is a continuing process and does not end after the interviews. Follow-up actions that are often necessary after each interview include the following:

- A written record of the performance evaluation interview can be helpful. Notes should be made promptly after the interview, with reference to preparatory notes, ratings, the employee's reactions and questions, and plans for future actions.

- In cases where an employee has serious deficiencies that need to be corrected, a correction program and time schedule should be drawn up and acted upon to ensure that definite improvement is made.

- In cases where the outstanding performance of an employee is going to be acknowledged by a meritorious salary increase, promotion, reclassification, or the exploration of new career directions, a schedule or plan should be agreed upon and followed through.

- The employee's questions and problems should be responded to on a day-to-day basis with whatever is required - assistance, recognition, praise, etc. This will encourage a positive work relationship with the employee and strengthen the periodic formal performance evaluation.

OHIO UNIVERSITY LIBRARIES CONTRACT-EMPLOYEE PERFORMANCE EVALUATIONS

Why do we rate? To evaluate an employee's performance openly, constructively, and objectively. To provide supervisors and employees with an opportunity to discuss all aspects of a person's work, personality, and abilities in relation to past performance, future potential, and specific job description.

The supervisor rates on the scale to indicate his/her general impressions of the employee, and the discussion elucidates the particular standards or requirements which the supervisor had in mind in making the evaluations. Written comments are essential for the record.

When do we rate? Evaluations on new employees, or employees promoted to new positions, will be made after 6 months' employment. All other contract personnel are evaluated in mid-February. If a 6-months' evaluation coincides with the February evaluation, they are combined.

Also, every contract person is invited to an informal conference in July by his/her immediate supervisor. This conference is an unofficial, informal preliminary progress report for the employee's benefit, and is not reported or made part of the employee's official record.

Special evaluations may be made at the request of the Director of Libraries at any time.

Procedure for rating: Examine the evaluation sheet, and read the instructions and definitions carefully before beginning the rating. After the supervisor has completed the rating, written his/her comments, and signed the form, the rating will be reviewed by the rater's supervisor (the supervisor-once-removed of the employee) who will add his/her written comments, and sign the form. Only then will the rating be discussed with the employee by the supervisor at a formal evaluation interview.

The employee, after the evaluation interview, may make any written comment he/she wishes, and will sign the form. The employee's signature indicates only that he/she has reviewed the evaluation and not that he/she necessarily agrees with it. If any additional comments are made by anyone after the employee signs the evaluation, it is to be returned to the employee for his/her initials to signify that he/she is aware of any additions. When the evaluation process is completed, the supervisor will provide the employee with a Xerox copy.

Appealing an evaluation: If an employee thinks that his evaluation is unfair, he/she may appeal it to his supervisor-once-removed, and may further appeal the rating to the Associate Director, and the Director of Libraries, in that order. An evaluation may not be appealed until after the evaluation process, as outlined above, is completed.

Instructions and Definitions

The supervisor's evaluation of the employee, on each trait, is indicated by circling the appropriate number on the scale. Each trait should be considered independently. The descriptive words and phrases above the scale illustrate behaviour which would justify a rating at that level. The "Comments" section below each trait should be used to illustrate strengths, weaknesses, potential, etc. If no judgment can be made about a particular trait (e.g., "Administrative Ability"), the supervisor will comment, explaining the reason for the omission (for example, "No opportunity to observe").

Quality of work: Consider the thoroughness of the work and accuracy of the results (irrespective of volume). Does the employee's work meet the established standards of such work? Is the employee effective in achieving results?

Quantity of work: Consider the volume of work output (be sure to keep in mind the nature of the work). Does the employee do as much as expected? If quantitative standards have been established, does the employee ordinarily meet those standards?

Knowledge of work and skills: Consider how well the employee knows the purpose of his/her work. Does he/she possess the skills necessary to function effectively in his/her job? Does he/she make an obvious attempt to keep abreast of new developments and to learn new techniques? Is the employee aware of the overall functions of the department?

Adaptability: Consider the employee's ability to adjust adequately and rapidly to changes in job duties. Does the employee adapt to new working surroundings and conditions? Can he/she work effectively during periods of continuing change? Does the employee learn new duties and understand explanations without undue delay?

Dependability: Consider the employee's reliability in carrying out instructions. Is the employee successful in carrying out assignments under unusual and difficult circumstances, as well as under ordinary working conditions? Can the employee be depended upon to do his/her job without undue delay?

Cooperation: Consider the employee's ability to cooperate with co-workers and other departments. Is this employee's manner of dealing with them cooperative, helpful, courteous and tactful? Does he/she seek personal gain regardless of the effects on others or the organization? Does he/she convey a healthy attitude concerning teamwork? Is new work accepted without undue complaining?

Judgment: Consider the employee's ability to think intelligently and make logical decisions. Does the employee, when faced with a problem, consider the problem thoroughly before making decisions? How well does he/she follow through after a decision is reached?

Initiative and perception: Consider the motivation the employee shows in performing the work. How much effort does he/she exert? Is he/she lazy? Does he/she require prodding? Do directions have to be continually repeated? Does the employee waste valuable time during working hours? Does the employee perceive areas of possible concern and take appropriate action or does he/she merely tackle assigned tasks?

Personal qualities: Consider the employee's attitude and manner on the job and also in relation to the public. Is he/she friendly and polite? Does he/she demonstrate poise and self-confidence? Is he/she loyal to supervisors, the department and the library?

Administrative/supervisory ability: Consider the supervisor's ability to get his/her assigned work accomplished with the best utilization of personnel, materials and time. Is he/she an effective leader? Is he/she fair to subordinates? Can he/she train subordinates to function effectively? Does he/she contribute to management planning sessions?

Professional development: Does the employee have a clear plan for professional development? Has he/she made a conscious effort to seek continued professional growth through professional reading, continuing education, research of library problems, writing, and publication?

Service to library profession/university service: How well does the employee accept his/her responsibilities to the library profession? Consider the employee's contribution to the profession. Does the employee demonstrate a knowledge of the profession in a larger context than the local conditions? How much does the employee contribute to the university through committee or service work for the greater good of the university or community? How well does he/she represent the library in his/her daily contacts outside the library?

Rater's comments: In an essay-type statement, the rater should sum up the total picture generated by the evaluation. Additionally, the rater may wish to comment on such topics as professionalism, participation in library/university activities, self-development efforts which have been made or might be made by the employee, examples of improvements or regression since the preceding rating, the employee's strong points or weaknesses, and the possibilities for promotion. The rater should sign the form in the space provided.

Reviewer's comments: In an essay-type statement, the reviewer may reinforce the comments of the rater and/or add additional comments. The reviewer should sign the rating form in the space provided.

Employee's comments: The rated employee may either agree or disagree with the rating or add comments. The employee's signature indicates only that he/she has reviewed the report and not necessarily that he/she is in agreement with it.

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HUMAN RESOURCES DEVELOPMENT

M. Beckman

IMPORTANCE OF THE PERSONNEL FUNCTION

Only in the past two decades have libraries in Canada come to recognize the importance of the personnel function. It is now, therefore, not uncommon for the larger academic and public libraries to have their own personnel office, with a librarian skilled in (and responsible for) personnel functions for the total library system. Although most large organizations have a personnel department for all staff, this specialized function has developed within the management structure of larger libraries in response to their need for personnel policies that directly reflect their particular concerns.

A library is a complex organization with two primary missions: it acquires and organizes resources and provides access to them; and it provides its users with direct services (reference, assistance, instructions, on-line retrieval, etc.). Engaged in these activities are a whole range of personnel - clerks, technicians, librarians, information scientists, computer operators, system analysts, accountants - all of whom must be coordinated so that the objectives of the library can be met. In order to keep library objectives constantly in mind when various personnel policies are implemented, it is essential to have on staff a person who is familiar with those objectives and is able to identify problems, concerns or issues involved in overall organizational personnel policies. In addition, the library personnel office can interpret personnel policies for the library managers to ensure that they are followed in all departments.

Within a smaller library or information centre, it is not possible to dedicate an entire position to this personnel function; nonetheless, all activities related to this function should be performed, albeit on a reduced scale. Attention to the personnel function, whether in a large library system or in a small information centre, can result in increased productivity and in more effective service to users.

IDENTIFICATION OF THE ORGANIZATIONAL STRUCTURE

The first task of management is to identify the organizational structure through which the various types and levels of staff will deliver the service or programs of the information centre. Such organizational structures will vary, of course, depending on the size of the information centre and the size of the parent company or institution.

The organizational structure of a very small information centre could consist of a manager, who performs all information activities, and a secretary. A larger centre, however, would have to plan the organization of its staff.

The organizational structure for the information centre in a very specialized government agency was described. It was pointed out that the traditional library functions are separated from those of analysis.

In the example discussed, the division between the "library" functions of collection acquisition and organization, and the analysis function, with a manager over the two was emphasized. Concerns were expressed about this type of organizational structure because it fails to recognize the interaction necessary between the collection function and the analysis/service function.

This was followed by an example of a more traditional organization where its functions encompass more than some information centres would, that is, technical writing and editing, and graphic arts services. The separation of literature searching from the library and filing services is again a problem, because these functions are not easily separated.

The organizational structure for a large and complex group that handles information for an aerospace research company was then described. Again, traditional library functions related to acquisition of books and journals are separated from technical document handling and from the indexing or analysis of information and the conversion of it to computer information systems.

Several other examples were given showing unnecessary divisions.

Finally, a model of organizational structure was discussed in which all functions - analysis, systems design, documentation, collection acquisition and organization, and information service - can be integrated. This structure is for a large academic library that offers both traditional and innovative library and information services.

Organizational structures clearly vary from one company or institution to another: they may reflect the management style of the director or may be designed to solve particular personnel problems. Unfortunately, all too often the structure reflects a "we-have-always-done-it-this-way" philosophy, which is not an adequate basis for any structure. Care must be taken to continually evaluate the organizational structure, ensuring that it adapts to changes in objectives or in information technologies.

CLASSIFICATION OF PERSONNEL

The purpose of the organizational structure is to define the way in which staff are grouped so that they can perform the functions necessary to fulfill the mission or mandate of the centre. There are three main classifications of personnel in most Canadian libraries or information centres - professional, technical and clerical - with further divisions within each.

Professional

The professional category normally includes four groups:

- Professional librarian/information scientist,
- Professional scientist,
- Computer professional, and
- Business/management professional.

The training for these four groups is different in each case and is described in detail in another presentation.

Technical

In Canada, there is new emphasis on this category of employee within the library and information centre. There are three types of technical employees:

- Library technician,
- Computer/media technician, and
- Equipment technician.

Clerical

The clerical group also divides into three groups, each related to the skills required for the various tasks involved:

- File or shelf maintenance personnel,
- Stenographer/secretarial, and
- Data input/coding clerks.

JOB DESCRIPTIONS

There must be a job description for each job or position category, as well as for each individual person. The first type is called a generic job description: it describes the general scope of the job, the skills required, the dimensions (size of impact), accountability, and freedom to act, and then gives a list of typical tasks. The second, the specific job description, expands on the generic, giving much more detail about the various job activities, whom the person reports to, who else is in the department, etc.

CAREER PATH

In addition to classifications and job descriptions, there must also be a career path for the employee. This is achieved by clearly defining how employees may progress through the various levels within each category, or into another category.

The following is an example of a nonprofessional career path:

Library Assistant	I	Levels 1-5
Library Assistant	II	Levels 1-5
Library Assistant	III	Levels 1-5
Library Technician	I	Levels 1-5
Library Technician	II	Levels 1-5
Supervisor	I	Levels 1-5
Supervisor	II	Levels 1-5

In the professional group, there may be different career paths for each type of professional:

Information scientist/librarian I
Information scientist/librarian II
Information scientist/librarian III
Information scientist/librarian IV
Systems analyst I
Systems analyst II
Systems analyst III
Systems analyst IV

There is usually not more than one level for a business officer in an information centre because the level of this position must be established in relation to other similar positions in the parent company or institution.

The levels of the various classifications and the qualifications needed to move from one level to another should be determined through a personnel evaluation system and used for all employees. This ensures equity for all.

QUALITY OF WORKING LIFE

Having job classifications, job descriptions, job evaluations and a career path for all staff does not constitute a complete personnel program. What else is needed is attention to the work environment. In Canada, that aspect of the personnel function is called the Quality of Working Life (QWL).

The many aspects of QWL differ according to the size or nature of the library/information centre or of the parent organization itself. I have selected five programs that can be part of QWL, and will describe these briefly.

Motivation

It used to be believed that the one factor that motivated an employee was salary. Although important, research has found that salary is not the most important factor in an employee's successful contribution to his or her job. Far more significant is the employee's sense that the job is important and that he or she is a valuable part of the centre or organization. In order to motivate an employee, therefore, the employee must first of all understand what is expected of him/her. This process is not exactly like a job description, but is more like a performance evaluation program.

In such a program, objectives or expectations are established for each staff member, and are reviewed both in writing and in a personal interview at least annually. This then gives the employee an incentive to do better, and gives the supervisor an opportunity to congratulate the employee on various achievements during the previous year.

Setting goals for productivity and then giving rewards for success is also a useful motivation technique for repetitive, low-skill tasks such as shelving books or pasting labels. Rewards can include lunch with the director or some small monetary award.

Other useful devices in the motivation program include:

- Arranging for all new employees to meet the information centre director,

- Giving special recognition for long service or perfect attendance, and

- Providing publicity for various achievements (e.g., productivity, innovation), perhaps through an information centre staff newsletter.

In-service Training

Employees cannot improve their qualifications and move up the career ladder unless some opportunity is given for them to improve their skills on the job. This is accomplished by organizing skill-training sessions for all clerical or technical routines in the information centre. The supervisor first prepares a manual outlining the tasks involved in each job. Then, groups of employees from other units meet to have these skills and responsibilities discussed and demonstrated. The only result of this activity may be that all staff members better understand what other staff members do, but that understanding in itself contributes to a better work environment. Besides the fact that most employees enjoy learning something new and different, in-service training in all aspects of the library/ information centre program helps reduce feelings of insecurity when new technology is being introduced.

Cross Training/Job Rotation

In a cross-training program, which is similar to the in-service training program, one group of employees is trained to do the work of another group. This can lead to either permanent transfers or temporary job rotation. In either case, it provides an opportunity for an employee who may be bored with his/her work but who does not have the qualifications to move up in the classification, to move sideways into another job. Increased motivation, job satisfaction and a concomitant increase in productivity are often the result.

Study Leaves or Courses

Another device for encouraging personnel is a program of study leaves. It may be of short duration, such as a 1- or 2-day course in supervisory work or in stress management, or it may be a semester program for advanced qualification in library technology, a scientific discipline, management, or information/computer science. All course opportunities should be monitored by management, and employees made aware of what is available. Needless to say, very few staff members can take advantage of the longer study leave program; but if short seminars are made available regularly and some staff members are selected for a longer course, staff morale will be raised.

Personnel Counseling

Personnel counseling may occur for a variety of reasons, but it is most successful if it is related to specific routines such as performance evaluation, or to a specific problem such as absenteeism. Absenteeism can be a serious problem in Canadian libraries and information centres, and we have found that personnel counseling can greatly reduce the absentee rate. First, it is necessary to:

- Identify the absentee rate for an entire unit by type of employee;

- Identify those employees whose absentee rate is above the average for their unit, classification or for the library/information centre as a whole; and

- Eliminate from this group those whose absentee rate was high because of one long illness (e.g., major surgery, heart attack).

This leaves a group that has a higher than average absentee rate, based on 1- or 2-day absences. These staff are called in to be interviewed by the supervisor or by a personnel officer in a larger organization. In the interview, the following points should be discussed:

- The burden that the absence places on fellow workers,

- The health habits of the employee (e.g., adequate sleep, exercise, diet), and

- The loss of opportunities for promotion as a result of continued absence.

If this counseling is accompanied by awards for perfect or improved attendance (such as recognition in the newsletter or by the director), the absentee rate of the information centre should decrease and the whole centre staff will be more productive.

These are only some examples of the QWL program, which in turn is only part of the personnel function of management. There is no question that attention to this function can increase both the efficiency and effectiveness of a library/information centre's services.

CASE STUDIES

CISTI

M. Beckman

HISTORICAL BACKGROUND

CISTI, the Canada Institute of Scientific and Technical Information, has evolved over the years from what was originally the National Science Library. Unlike most national libraries, it came into being not as the result of one specific Act of Parliament, but through a long series of government directives and cabinet decisions. The Library had its beginnings in 1924 when a small resource collection was established to serve the scientific staff of the newly organized laboratories of the National Research Council of Canada (NRC). The first President of the NRC firmly established the future course of the Library when, in a letter to the Carnegie Corporation, he announced his intention of "building up at our central office in Ottawa, a library that would serve scientific workers everywhere in Canada."

When the National Library Act was passed in 1953, through an agreement signed by the President of the NRC and the National Librarian, it was decided that rather than duplicate the extensive resources of the NRC Library, the National Library would concentrate its limited funds on the development of collections in the humanities and social sciences. The NRC Library would in turn continue to strengthen its resources in the fields of science and technology in order to keep pace with the NRC's growing needs, and to meet the needs of individuals and libraries outside the NRC that were turning increasingly to the Library for publications and information not available elsewhere in Canada. The NRC Library had become in fact, if not in name, the National Science Library.

ORIGINAL MANDATE AND EXPANSION TO PRESENT TERMS OF REFERENCE

In 1966, this de facto position was formally recognized through the revision of an Act of Parliament: the NRC was given responsibility for the operation and maintenance of the National Science Library (NSL) to serve Canada. This formal action was further strengthened in 1970 when, through a Cabinet directive and as the result of a series of studies dealing with scientific information policies, the NRC was given the mandate to develop, under the general direction of the National Librarian, a national scientific and technical information (STI) system, or more correctly, a national network of scientific and technical information services. It was assumed by many, both in Canada and abroad, that this concept of a national decentralized scientific and technical information system, which utilized information resources and services wherever they existed, was something quite new. For many years, however, Canada had had the foundations of a national STI system, with the NSL serving as its focal point.

Given new impetus by the Cabinet directive of 1970, the NSL tackled its national responsibilities with renewed vigour, taking whatever steps were necessary and possible to ensure that scientists, engineers, technologists, research workers, and managers had ready access to the scientific and technical publications and information they required in their day-to-day work. The basic aim was to channel the right information to the right person at the right time.

Because of the rising flood of scientific and technical information, it soon became evident that this aim could not be achieved through normal library procedures. The Library therefore focused on the development and application of electronic techniques to facilitate the retrieval and dissemination of information - the major role of CISTI today.

OBJECTIVES

The objectives of CISTI are included in those of the NRC itself. The NRC has three major objectives:

- To provide a national foundation for the creation and application of knowledge derived from the natural sciences and engineering;

- To promote and support the development and maintenance of research and the provision of highly qualified personnel in the natural sciences and engineering; and

- To facilitate the use of scientific and technical information by the government and people of Canada.

The last of course is the objective that relates to CISTI; so I will expand it to include the three main subobjectives and a program description.

Subobjectives

The three subobjectives are:

- To provide and maintain services associated with scientific and technical information to meet the needs of the government and people of Canada;

- To conduct research into the need for and methods of transferring scientific and technical information in response to user needs; and

- To participate in the overall provision of library and information services for the government and people of Canada.

Program Description

There are three main elements to the program description:

- Information services comprise the operation and support of services to provide for the collection, storage, retrieval, analysis and transfer of scientific and technical information; it also includes support for the publication of journals of research in engineering and science.

- Network implementation consists of the implementation and maintenance of a Canadian network of scientific and technical information services and a referral service network, including the establishment of links with other national and international networks and services.

- Research and development involves research into the requirements for the collection, storage, retrieval, analysis and transfer of scientific and technical information; the improvement of these and other related processes and the development of new processes to meet the demonstrable needs of users; the development of standards, procedures and processes for intersystem exchanges of scientific and technical information, by means of participation and agreement with other national and international organizations.

SERVICES

Over the years, CISTI's resources have been continuously developed in close cooperation with all major libraries in Canada. These resources and services are designed to complement and supplement local resources and also to provide essential backup to the information services provided by the CISTI staff of information specialists. The linking of these national STI resources into a national library network was achieved by 1957 through the publication of the Union List of Scientific Serials in Canadian Libraries (ULSS). This was the first of the many national services provided by the NSL and then by CISTI (to be discussed in more detail on 13 December). I will briefly describe some of their other services so that you can realize the scope of the operation:

- CAN/SKI is a computer-based current awareness service;
- CAN/OLE is an on-line system for retrieving citations from bibliographic data bases;
- CAN/DOC is an on-line system that allows the user to order the document as soon as a citation is found;
- Lending and photocopying is a service that either loans books and reports or makes photocopies;

- Information (reference) is a service that provides subject searches or general information on any aspect of science or technology;

- Health Sciences Resource Centre performs all the above services, but is related specifically to medicine;

- Scientific numeric data bases maintain inventory and access protocol for worldwide numeric data bases;

- Knowledge Source Index maintains an inventory of Canadian specialists in science and technology throughout Canada;

- Information Exchange for Federally Supported Research in Canadian Universities (IEC) is an on-line data base maintained by CISTI; and

- Canadian Index of Scientific Translations is a service similar to IEC, with photocopies of the translations available.

ORGANIZATIONAL STRUCTURE

The NRC receives its direction from a governing council, which consists of representatives of the scientific industry, government and scientific universities. However, its management consists of a matrix of interaction between two components:

- A hierarchical structure consisting of a president, four vice-presidents, and three group directors (for the laboratories), and

- A horizontal structure with cooperative projects evolving in a number of laboratories.

The Management Committee, consisting of the positions just named and the Director of CISTI, assists the Council in formulating policies, and is responsible for implementing approved policies and programs.

CISTI reports to the NRC Vice-President, External Relations, and has an internal organization as shown in Fig. 1.

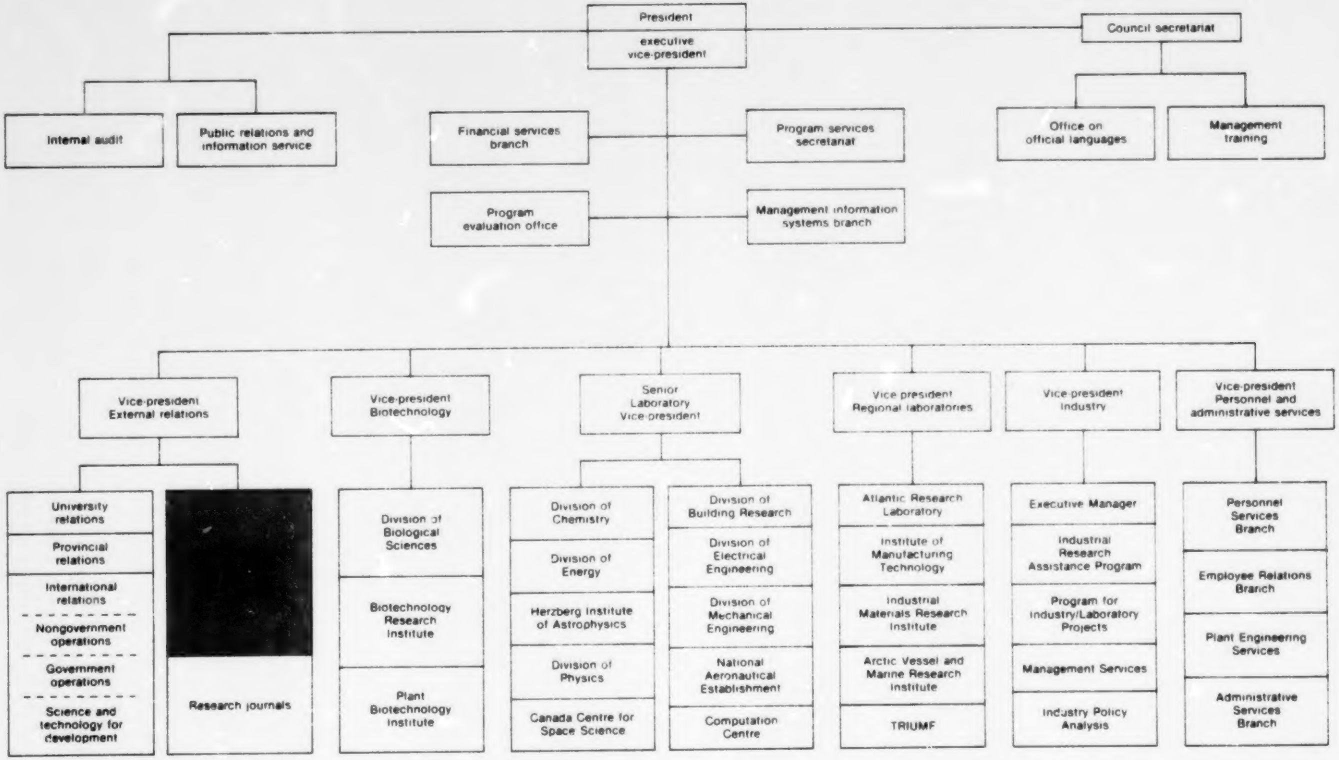
President
executive vice-president
Council secretariat
Internal audit
Public relations and information service
Financial services branch
Program services secretariat
Program evaluation office
Management information systems branch
Office on official languages
Management training
Vice-president External relations
Vice-president Biotechnology
Senior Laboratory Vice-president
Vice president Regional laboratories
Vice-president Industry
Vice-president Personnel and administrative services
University relations
Provincial relations
International relations
Nongovernment operations
Government operations
Science and technology for development
[redacted]
Research journals
Division of Biological Sciences
Biotechnology Research Institute
Plant Biotechnology Institute
Division of Chemistry
Division of Energy
Herzberg Institute of Astrophysics
Division of Physics
Canada Centre for Space Science
Division of Building Research
Division of Electrical Engineering
Division of Mechanical Engineering
National Aeronautical Establishment
Computation Centre
Atlantic Research Laboratory
Institute of Manufacturing Technology
Industrial Materials Research Institute
Arctic Vessel and Marine Research Institute
TRIUMF
Executive Manager
Industrial Research Assistance Program
Program for Industry/Laboratory Projects
Management Services
Industry Policy Analysis
Personnel Services Branch
Employee Relations Branch
Plant Engineering Services
Administrative Services Branch

Fig. 1. Administrative organization of the National Research Council of Canada.

CISTI is also guided by the Advisory Board for Scientific and Technical Information (ABSTI). This board, with representatives from industry, government and universities across Canada, advises the NRC on the development of the STI network and on the delivery of STI services.

MANAGEMENT AND OPERATION

In addition to the central CISTI building, which houses the main collection of some 300,000 monographs, 34,000 serial titles and 1.6 million microfiche, the system also includes 14 branches, coordinated by the Head of Branch Facilities. These branch libraries or information centres have developed in parallel with the NRC laboratories, and provide a full range of information services to about 3000 research and technical staff, in direct support of laboratory research. The branches are also a vital link with the scientific and engineering staff of the NRC, providing access to CISTI's central collection and services, and maintaining close contact with current research and scientific and technical developments.

The following is a list of its branch information centres:

Administration
Aeronautical/Mechanical Engineering
Atlantic Research Laboratory
Building Research
Chemistry
Dominion Astrophysical Observatory
Dominion Radio Astrophysical Observatory
Electrical Engineering
Energy
Industrial Materials Research Institute
Physics
Prairie Regional Laboratory
Sussex Laboratories (Biological Services and
  Herzberg Institute of Astrophysics)
Uplands Laboratory (National Aeronautical
  Establishment)

Because these branches are located as far apart as

British Columbia and Nova Scotia, monitoring and coordinating their activities is a challenging role for CISTI.

The Head of Branch Facilities joins with the Director and Assistant Directors in managing CISTI. The organizational structure of CISTI was changed 2 years ago and is outlined in Fig. 2.

The Director's responsibilities include:

- The setting of national policies,
- Planning, programing and budgeting processes,
- The communication of CISTI's objectives and services within the Government of Canada and to Canadian scientific, technological and biomedical communities,
- Operational decisions that affect other organizational units within CISTI,
- Operational review and performance measurement,
- Organizational development and human resource planning, and
- Participation in international STI organizations.

The Assistant Director automatically replaces the Director in his/her absence. This position involves management of the following activities:

- Acquisitions,
- Cataloging,
- Document delivery,
- Information services, and
- Health Sciences Resource Centre.

Because the number of levels of reporting relationships in CISTI has been reduced, it now has a relatively flat organizational structure. This means that

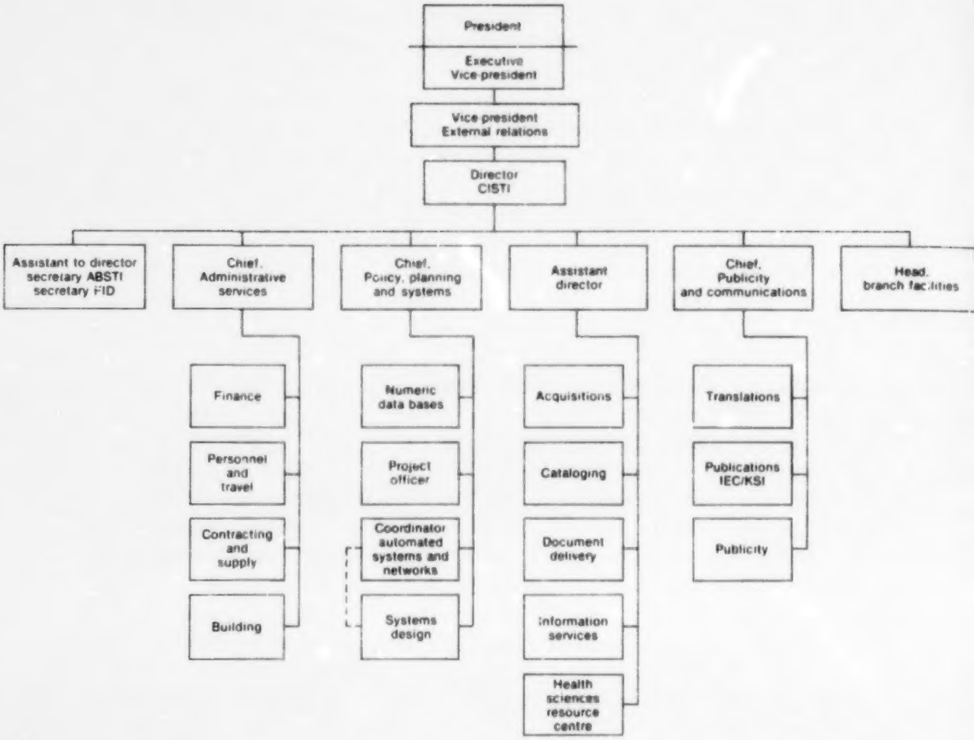
President
Executive Vice-president
Vice-president External relations
Director CISTI
Assistant to director secretary ABSTI secretary FID
Chief, Administrative services
Chief, Policy, planning and systems
Assistant director
Chief, Publicity and communications
Head, branch facilities
Finance
Personnel and travel
Contracting and supply
Building
Numeric data bases
Project officer
Coordinator automated systems and networks
Systems design
Acquisitions
Cataloging
Document delivery
Information services
Health sciences resource centre
Translations
Publications IEC/KSI
Publicity

Fig. 2. Organizational structure of the Canada Institute for Scientific and Technical Information.

a policy and operational decision can be made quite easily: the functional head is involved in the policy development and therefore has no difficulty in accepting and implementing it.

The restructuring of the organization was based on the notion that every layer of management must be responsible and accountable for the following elements:

- Planning,
- Organizing,
- Staffing, and

- Directing and Controlling.

The general management of CISTI operates through a committee structure, consisting of the following:

- Director,
- Assistant Director,
- Chief, Publicity and Communications,
- Head, Branch Facilities,
- Chief, Policy, Planning and Systems, and
- Secretary of the Advisory Board on Scientific and Technical Information.

In addition, three senior resource people sit on this committee. This committee meets biweekly and deals with general operating problems, priority setting, and personnel matters such as training and negotiations. In addition to the Management Committee, there is a Project Review Committee consisting of the Director, Assistant Director, Chief of Policy, Planning and Systems, and the Head of Branch Facilities. This committee is responsible for the allocation of discretionary human and financial resources; it functions through a Project Management system whereby projects are submitted for approval by all levels of staff and prioritized by the committee and rank ordered in relation to the needs of the client communities.

In order to give you an idea of the breadth and complexity of CISTI operations, let me illustrate with actual statistics from 1980-81:

- The Lending and Photocopying Section received 184,000 requests via mail or telex, with an additional 28,000 received directly at CISTI and 45,000 received in the branches, for a total of 258,000. Of the photocopy requests received, more than 80% were filled within 36 hours. Telex and the new on-line facility, CAN/DOC, were used for an increasing number of the requests.

- Bulk delivery service was made to distant areas of Canada such as Calgary, Vancouver, Halifax, Winnipeg, Regina, Saskatoon and Edmonton, and CISTI participated in university transit systems in two provinces, Ontario and Quebec.

- Of all the loans and photocopy requests, 23% were from academic institutions, 32% from government agencies, and 45% were from industry.

- CAN/OLE provided access to 10.8 million citations, and printed 1.29 million citations for the STI sector. Eighteen separate data bases were available in CAN/OLE.

- CAN/SDI provided current awareness based on 19 data bases.

- Subject reference completed 894 comprehensive searches and 2100 shorter searches.

- The Health Sciences Resource Centre had 110 dispersed MEDLARS centres. There were 17 data bases in the system and 4924 hours of search time were spent; 855 health-related reference questions were also answered.

- Collections were increased by 30,000 titles and subscriptions continued for more than 21,000 serials. Cataloging of this material is done via an automated system called DOBIS, which is also used by the National Library and other federal government libraries in Ottawa.

BUILDING

The CISTI building is unique in concept and design. It contains 360,000 square feet (33,500 m^2) of gross space, spread throughout eight floors, and incorporates the latest mechanized techniques for transporting material both vertically and horizontally within the building. The ground floor contains many of the technical support services. The first floor is the public area, which is located around a central information desk. The Technical Information Service is located on the second floor. Above this floor is a smaller five-storey tower, with the mechanical equipment for the building on the roof of this section. The third floor is occupied by offices and an environment-controled, fire-protected computer area. The fourth, fifth, sixth and seventh storeys contain the book and document stacks.

An important design feature of the building is humidity control. The ideal humidity level for books is a constant 50%, much higher than normally encountered indoors in winter. Because this high humidity level required a special insulating technique, a wall design was developed by the NRC's Division of Building Research. Called a rainscreen, it consists of a layer of plastic sheeting between the insulation material and the interior wall of the structure. As moisture penetrates through the inner wall, it condenses on the plastic sheet and collects in a drainage area beneath. The insulation therefore remains dry and efficient.

The building is a light sand colour with gray concrete columns rising from the corners of its base. It is the first Canadian building constructed by the federal government that conforms to new Building Code standards regarding resistance to earthquake damage.

RELATIONSHIPS

The relationship with NRC research scientists and technicians occurs mainly through the branch libraries, where direct information service from specialized resources can be given. Many scientists and the central staff make use of the facilities at CISTI as well because they have been specifically designed for an in-depth research environment.

Connections with the scientific community are fostered through newsletters, the work of the NRC council, the Technical Information Service, and meetings held by ABSTI.

The academic community is linked to CISTI through each university library. The scientific and technical journals at each such library are listed in the ULSS, and thus are accessible through CAN/OLE. (All universities and many college libraries are CAN/OLE and CAN/SDI Search Centres.) Training in the use of these systems was provided by CISTI staff.

Special information centres in government or industry also maintain direct relationships with CISTI, and depend on them to provide access to and copies of many of the documents required by their staff.

Thus, through the STI network of which CISTI is the centre, the scientists, researchers, industrialists, managers, policymakers and academics have access to any information required, with maximum ease of retrieval.

MANAGEMENT OF DOCUMENTATION IN ISTIY: AN INTRODUCTION

Yu Dingqing

The Institute of Scientific and Technical Information of Yunnan Province (ISTIY) was founded in 1971. Its predecessor was the Information Department of the Commission for Science and Technology of Yunnan Province. It has a staff of more than 110, of which 69 are professionals (63% of the total). The Institute includes seven research departments, two sections and one workshop. The new building, which was constructed in 1982, is situated in the northeast of Kunming, covering an area of 10 Mu (equivalent to about 0.67 hectares) with about 6000 m^2 of floor area. Five separate reading rooms are located on the third, fourth, fifth and sixth floors. They can accommodate 300 readers. The building has good transportation facilities and is well located: seven major universities and colleges, several dozen professional research organizations, as well as hundreds of enterprises are found within a few kilometres. The location therefore provides excellent conditions for carrying out a wide variety of information service activities.

FUNCTION AND STRUCTURE

Yunnan is a multinational frontier province. It covers an area of about 380,000 square kilometres and has 22 national minorities and a population of 32 million. It has comparatively rich natural resources. The development of the local economy depends, first, on the government's policy and, secondly, on science and technology. The need for scientific and technical information plays a very important role in this respect.

ISTIY is the most comprehensive scientific and technological information centre in the Province, providing a link between the provincial government and grass-roots organizations. It is both a part of the nationwide information system and a focal point in the local information network. It has four functions in the processing of documentation:

- Storage, by which it can accumulate and control the flow of knowledge, and effectively reduce users' difficulties caused by the "information explosion";
- Conversion, by which it can put the dispersed and disordered flow of knowledge into order, change its structure, and follow a predetermined processing system to facilitate literature searches and document use in the future;
- Filtration (scanning); and
- Coordination.

Because of the requirements of a local information centre, the good range of local resources, the local economy, and its technical conditions, the Institute's four tasks are as follows:

- Documentation processing,
- Information analysis and synthesis,
- Exchange and dissemination, and
- Organizational coordination.

In our view, the organizational framework of the local information network should be both horizontal and vertical.

MANAGEMENT OF DOCUMENTATION

ISTIY regards the management of documentation as a very important part of scientific and technical information work. Accordingly, it retains 30,000 bound files of international scientific and technological serials, 0.8 million patent specifications, 30,000 items of trade literature, 3200 serials published in China, with 33,000 bound files, and other documents such as technical books, publications for retrieval, dictionaries, etc. From now on, with the improvement of the facilities and management and with stated requirements for the development of local economy, the collection of documentation will increase steadily in the years to come.

Acquisition

The main task in document collection is to effectively gather information through every available means. How well this task is performed will directly affect the quality of document collection and of user services as well. This Institute has two technicians in charge of the acquisition work. We do not cover the subjects of space technology, oceanography, and shipbuilding because they are not subjects of local importance. We emphasize "use in practice" and seek comprehensiveness on the basis of availability. So, we encourage our technical staff to leave their offices, make contact with users and familiarize them with relevant information services. They are also encouraged to acquire all kinds of material by the following methods:

- Purchase: So far we have ordered 1200 serials distributed through the Post Office and receive 400 serials via internal sources. Instead of ordering original publications from other countries, we order microfilms.

- Exchange: We have established exchange relations with 2500 scientific and technical departments, information organizations, research and design units, universities, colleges and technical schools, factories and mines, etc., from 28 provinces, cities and autonomous regions (with the exception of Taiwan Province).

- Requests: We often send letters to various organizations to ask for materials required to meet our users' needs. Generally, the documents obtained are stored in ISTIY and loaned to users. Some users have said that this kind of service is very helpful because it obviates the need for them to undertake long journeys.

- Collection through technical meetings: Various nationwide professional or information meetings held in Kunming give rise to the production of a large number of valuable documents of the nonconventional kind. We send our personnel there to collect these documents.

- Additional external collection: We organize collection tours to other cities once or twice a year. In recent years, we have been to Beijing, Shanghai, Tianjin, Wuhan, Guanzhou and other locations five times, obtaining 4000 documents. These materials are of great value for reference purposes.

Processing

This mainly consists of the classification, cataloging, and storage of primary documents, as well as subject analyses, bibliographies, indexes, abstracts and other secondary documentation. There are four technicians for processing Chinese serials, data in Chinese, and books. Because we now use the Discipline Classification Method in China, Classification of Chinese Books is our basic classifying tool. Classifying documents requires special knowledge: those engaged in it should have a wide-ranging scientific background in addition to their knowledge of library science. To maintain a high standard in classification and to reduce errors in processing work, one person supervises the process to achieve satisfactory retrieval for the user.

We have established a manual retrieval system for all collections of the Institute. After each document is classified, a card catalog is made for retrieval. There are four index cards: two classification, cataloging, and regional for controlling duplicates. The classification index cards are arranged in order to facilitate retrieval. The duplication checking system for Chinese materials and the procedures for purchasing serials provide good reference data for acquisition staff. They save a great deal of work in checking missing and duplicated orders.

In addition, we recognize that sometimes information is needed urgently by users. We therefore do all we can to shorten the cycle of document processing, which is usually about 1 week.

Services

The purpose of an information centre is to effectively provide information to users. Our users are from almost every field and include technicians, managerial cadres, workers, peasants, and students. Because the information that each group requires is quite different, the services should be varied.

Reading

At present, we have five reading rooms divided for users into Chinese serials, serials in foreign languages (including trade literature), reference books, and Chinese documents. In the past, reading rooms were small and narrow and accommodated only 4000 readers per year. The circulation of documents is about 4000 copies. We now operate a bulk-delivery service for external readers and also provide a reproduction service for readers.

Publications

This service is an important way of improving the utilization of information resources. Because we started it only recently and therefore lack experience, the service needs to be continuously improved. We offer both a ready-reference service and the retrieval of information according to the users' requirements. For selected special information, we prepare an analysis report. In the last 2 years, we have handled 110 consultation letters, provided 1600 copies on 12 subjects, 1150 articles and 3 comprehensive reports. This service does not only respond to requests; sometimes the Institute asks organizations if they require consultants. During the Kunming Fair of Scientific and Technological Achievements in August 1982, we carried out 254 consultations and achieved excellent results.

Exhibitions

Since the Institute was founded, 25 comprehensive or specific exhibitions of trade literature and information have been organized in 17 prefectures and cities, and in the counties of Kunming, Ahaotong, Dongchuan, Baoshan, Tenchong, Jinghong, Qujing, Dali, and Dehong.

At these exhibitions, there were 24,000 participants; 26,000 items of information and literature were displayed, and 1300 documents were loaned to users. To achieve better results, we asked local scientific and technological departments and information organizations in the exhibition areas to make exhibition plans or to send staff to help in selecting exhibits that met their local requirements. We have also used charts, pictures, films, and slides, etc., to enhance the transfer of new technology in the frontier regions of minority nationalities.

EFFECTIVENESS OF INFORMATION PERFORMANCE

During the last 2 years, we have started to pay attention to providing required information with minimum labour costs and with greater benefit to our users.

First of all, to strengthen the reading service, a Reader's Book has been made available, which allows readers to write down their comments on or complaints about our work. We also maintain a registration roll. Because readers are invited to write down their names and the organizations to which they belong, we know how many readers there are each year and what their needs are.

Secondly, we think that the information analysis service should emphasize actual R&D results and economic benefits. For example, when technicians, cadres, and the masses in the frontier regions were shown items of information, they often read them with great interest. A doctor from Minzu Hospital of Dehong Prefecture, for instance, was very happy and grateful when we obtained a paper about the electrocardiogram for her.

Through the reference service, we have solved many production and research problems. For example, we provided information on fragrant fruit oil in accordance with a request from the Commission for Science and Technology of Baoshan County. The papers greatly helped the Commission staff in developing local resources. Another example is that Kunming Washing Machine Factory was able to improve the quality of its products after receiving information and samples from us. (At the Guanzhou National Washing Machine Exhibition in 1981, their products were very well received by consumers.)

Information on chrysanthemums with sweet leaves was also welcomed by the Commission for Economy and the Commission for Science and Technology of the Province. A production program has now been planned and a contract for the exportation of dry leaves has been signed by China and Japan.

Thirdly, we find that user surveys are essential in achieving our objectives and improving our work. Based on the survey of the use of information in scientific and technical achievements published in 1978-80, five priorities have been drawn up for our local information work.

Finally, we have paid special attention in recent years to the training of information users and have achieved very good results. Under the assistance of ISTIC, we held three training courses for information specialists in three provinces of southwest China, as well as various other information training courses within the Province. A total of more than 400 provincial and prefectural participants attended those courses. Such courses are clearly useful in popularizing information services, to sensitize users and in encouraging them to use information. After one of the training courses, one centre restructured its organization. In Chuxiong Prefecture, there is now an information and book network supported by 34 units in various fields. There are about 20,000 catalog cards in that retrieval centre. Last year, the whole network received 16,000 readers.

CASE STUDY AT ISTIY, 16 December 1982

VISIT TO THE INSTITUTE

Lecturers and participants were received by Mr Yu Dingqing, Director of ISTIY, who gave a talk describing the objectives and activities of the Institute.

After the paper was presented, lecturers and participants circulated around the Institute, talking with staff and viewing the facilities and services.

PARTICIPANTS' AND LECTURERS' COMMENTS ON THE STUDY

The Building and Facilities

There were favourable comments on the location of the Institute (in relation to nearby universities and research institutes), the effective use of daylight, the spaciousness of the reading rooms, and the potential for using modern materials and methods. The structure was considered generally pleasing and the layout of the interior was considered flexible.

The load-bearing capacity of the floors, however, could have been improved at the planning stage to avoid the present limitations on the placing of stacked material. Construction costs could have been lower and the control of user access could have been improved if more attention had been paid to constructional requirements. Fire precautions seemed to be inadequate, and there was a need for an easily accessible central catalog area. One comment was that the ceiling was not high enough; but in discussion, this height was considered debatable in view of the need to provide natural lighting and adequate storage space. The desirability of installing two-level shelving was discussed, but its use was considered inappropriate.

There was a feeling that the noise level within the building was unacceptably high: this was largely due to external noises, particularly from the market. It was later learned, however, that the market is to be relocated.

Some considered that the building had a greater affinity to an office block than an information centre. Because many of the materials were scattered, users had difficulty locating books, periodicals, and bibliographic tools. This difficulty might be solved by repositioning these materials on the first and second floors.

The placing of the reference material and indexing and abstracting journals was considered undesirable. It was suggested that directional signs should be placed at strategic points throughout the building. Discussants were informed, however, that this action is already in hand.

Collection and Acquisitions

It was thought that the selection of materials was relevant to the needs of the Province (particularly regarding forestry, mining, crop husbandry, animal husbandry, and machine production), but that the stocks of bibliographic tools and reference materials needed to be strengthened. One suggestion was that the secondary journals should be placed beside primary journals. Many participants considered the budget of RMB 100,000 for acquisitions to be too small - and is in fact below average compared to other provinces. A lecturer suggested that a union list for Yunnan Province should be compiled as a means of sharing resources within the Province. Discussants learned that a union list of serials in the Province has been published annually by the Institute and that a national union list of serials is at the planning stage.

User Services

Participants considered the outreach program of the Institute to be commendable and thought the fact that the Institute staff had undertaken user surveys in the city and surrounding communities was particularly innovative. The number of users (4000 per year) was estimated to be lower than the potential number because of the space limitations in the Institute's previous building. In order to improve services, it was thought to be important to train and motivate users. To be fully effective, however, it was necessary to instruct users in English.

Staff Personnel and Training

Great attention had been paid to on-the-job training and the continuing education of the staff. The general educational level of the 69 professional and technical staff was considered adequate: 50 had university degrees, and others had at least high school education. Nearly all these staff have been given additional short-term training. The most urgent need, as seen by the participants, was how to apply new concepts and techniques to the work of the Institute.

COMMENTS BY IDRC LECTURERS ON THE ISTIY CASE STUDY

Budget and Organizational Structure[1]

Annual budget for 1982	350,000
Amendments	60,000
Carried over from 1981	50,000
Total budget for 1982	460,000

The cost of the new building (4800 m^2) was 1,720,000.

The 1982 annual budget was subdivided as follows:

Personnel	87,600
Equipment (library)	80,000
Administration	45,000
Acquisitions	70,000
Equipment (printing)	65,000
Science & Technology Weekly	65,000
Contingencies	20,000

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[1] The data given are expressed in Chinese dollars (RMB Y): 1Y = US$0.515.

The organizational structure is illustrated in Fig. 1.

Training

The total number of staff is 110, of which 69 are technical staff (comprising 17 librarians and 52 subject specialists with degrees in different disciplines), and 41 are managers and workers.

Professional librarians are trained in two library schools in China, one of which is in Beijing. The full course lasts 4 years. ISTIY also uses other libraries for in-service training.

Users

In the old building, ISTIY handled 4000 users annually (i.e., 13/day). In the present new building, the Institute expects to be able to handle 40,000 (i.e., 128/day). These users would come from Kunming and only minimally from hinterland towns and villages.

In personal conversation, Mr Yu said that about 70% of users are from universities and research organizations (i.e., scientists, technicians, and students) and about 30% from industry and commerce (i.e., managers, workers, and farmers). One Deputy Director said that these figures differ from the government's intended emphasis on the development needs of "small enterprises and factories" (i.e., industry and commerce). Staff of the Institute did act as advisory consultants to industrial and commercial concerns and thereby increased awareness of the Institute's services. They admitted, however, that they had a public relations problem in this area.

Another means of contact with users is by mail, but data on the volume of correspondence did not seem to be available.

Users who are concerned with lines of research or study for which central information services already exist, usually use these services and not those of the Institute. As far as experienced professionals are concerned, therefore, ISTIY offers a "first-contact"

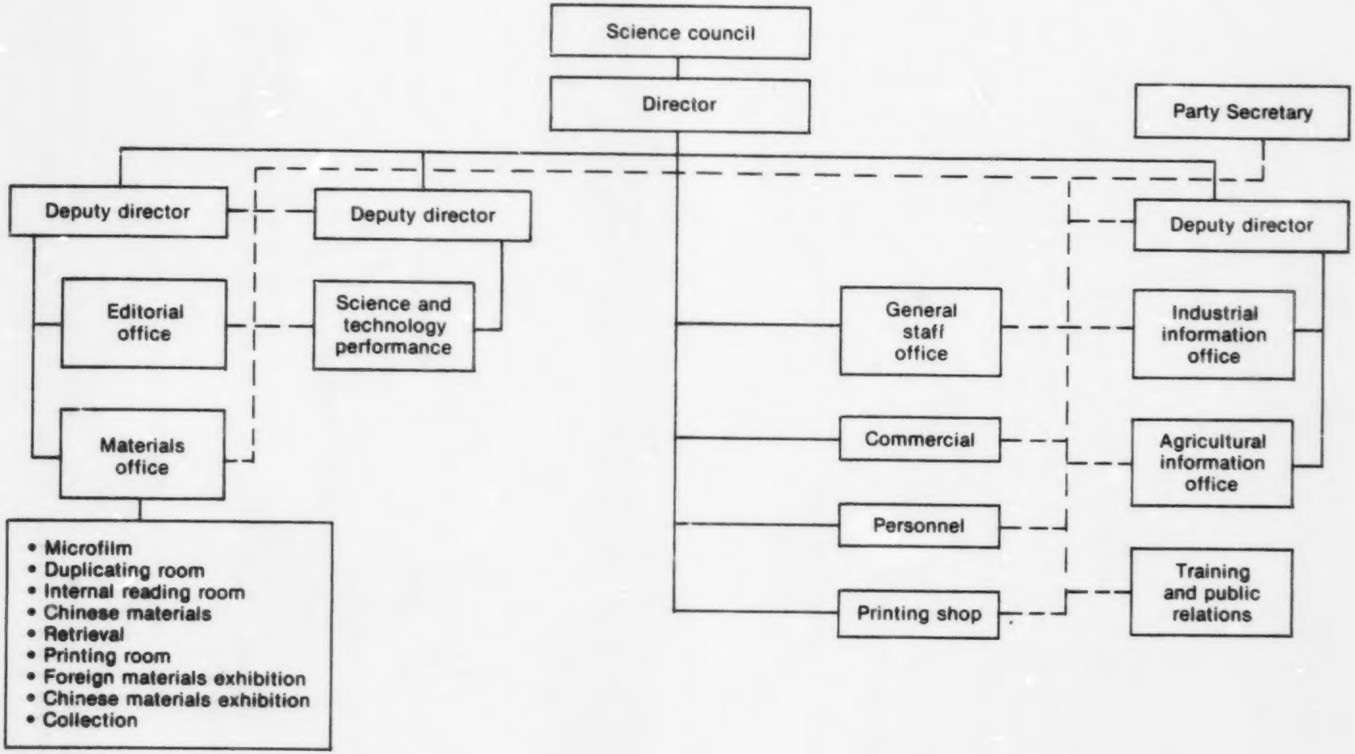
Science council
Director
Party Secretary
Deputy director
Deputy director
Deputy director
Editorial office
Science and technology performance
Materials office
General staff office
Industrial information office
Commercial
Agricultural information office
Personnel
Printing shop
Training and public relations
• Microfilm
• Duplicating room
• Internal reading room
• Chinese materials
• Retrieval
• Printing room
• Foreign materials exhibition
• Chinese materials exhibition
• Collection

Fig. 1. Organizational structure of ISTIY.

information service to users, rather than in-depth subject-based information services.

The Building and its Functions

Although many participants originally found several good points about the building, I was able to find only one: the location. (ISTIY is situated close to universities and scientific and technical industries.) Most features of the building contravene standard library design concepts. The following are examples:

- The bay size (4 m on column centres) is too small to allow efficient placement of stack ranges. The aisles are unnecessarily wide (100 cm) and more cross-aisles are required. (Stack ranges of six double-faced sections cannot be located.)

- Lighting is inadequate for both stacks, aisles and users after daylight is gone. Some stack aisles become totally dark.

- Flexibility is limited. The fixed walls do not allow any future changes and are inefficient because they require corridors. If the columns were load-bearing, as they should be, it would be better to have the floors totally open, with only one reader-service desk for each public floor and with necessary reference collections, including abstracts and indexes, nearby.

- Similar functions are not grouped together. For example, the reference function is dispersed throughout the building.

- Core areas are badly placed in the centre of the building, causing a great loss of flexibility in the layout of information functions.

- Signage, which is much needed, is totally lacking.

- There is no feeling that the building is an information centre or a library - although this should be immediately apparent when a user enters the building. The first thing users should be conscious of is an information desk where they can get assistance, with collections - and probably essential references - nearby.

- Sound control is totally lacking. In addition, some stacks are placed next to windows where direct sunlight will cause the paper to deteriorate and disintegrate very rapidly.

Services

The provision of services at the Institute was confined to the weekly publication of a current awareness information sheet, "Catalog of Chinese Scientific and Technological Information". This sheet would not be regarded in most libraries outside of China as a current awareness bulletin at all because it contains very few items related to new science and technology matters: it is more like a newsletter, although it does contain one or two bibliographic references. It is very broad in scope and does not focus on any one subject area in particular.

The service that was given the most attention by ISTIY was the consultancy service, which we would more precisely call a referral service. It is not a pure referral service, however, because most of the work tended to be of a commercial nature, supplying commercial firms in the export market with specifications and plans and background material. For instance, a lot of work had been done at the Canton Trade Fair for local products and some work has also been done in industry to provide information on manufactured products.

There seemed to be very little bibliographic work; and although the Institute claimed to be doing information analysis, there was no evidence of this. An SDI service was also supposed to be in operation; but without evidence of it, we can only assume that it must be a low-level activity.

Collections and Resources

Collections

The Institute's collection consisted of approximately 200,000 volumes of books and bound periodicals (135,000 and 65,000 respectively), 800,000 bulletins, and 30,000 product catalogs and examples. Currently, the Institute receives 1200 journals from abroad and 3200 domestic journals. While almost all of the foreign journals are received by subscription, the majority of the domestic journals are received through exchange with 2500 organizations in 28 provinces.

The book collection is largely old and dated. The collection of reference materials, as well as indexing and abstracting journals, are inadequate by Western standards. The whole collection of some research volumes is limited to the Chinese indexes and catalogs published by ISTIC and other specialized information centres under the various ministries and research institutes.

Acquisitions

The annual acquisitions budget was said to be RMB 100,000 in 1982-83. It is about 15-20% of the total budget of the Institute. Approximately 90% of the acquisitions budget is for journals, whereas only 10% is for books.

Like other libraries and information centres in China, the purchase of foreign publications is handled through the China Book Company, which periodically distributes a book list for selection. The purchase of domestic publications is by direct mail order. Another method of acquisition used quite regularly by the Institute is to send staff on a field trip to many parts of the country to select and purchase needed materials. Two professional staff are currently responsible for the searching for and selection of material for purchase.

Cataloging

Chinese Classification for Books and other Materials is employed in the cataloging of books and periodicals and is used for shelving arrangement. Current Chinese journals and current journals in foreign languages are housed in separate reading rooms.

The Institute has published a Catalog of Chinese Scientific and Technical Information, a Catalog of Chinese Scientifc and Technical Journal Titles, and a Union List of Original Foreign Serials in the Province, but none were seen during the tour.

The current catalogs for the collections are not up to standard.

Summary

There was general consensus among both course participants and the lecturers that:

- There were no signs or floor plans to direct users to the various collections, perhaps because the building was only recently occupied.
- The reference collections, including indexing and abstracting journals, are inconveniently housed on the top floor and are difficult to access.
- Most of the reference materials are dated and are inadequate to provide reference service.
- The cataloging and classification of the library materials are not up to acceptable standards.
- The microfilm readers for the patents collection are very old models and are not in working condition.
- In general, the entire collection is not sufficiently used.

Appendices

APPENDIX 1. SCHEDULE OF THE COURSE

Monday, 6 December

09:00	Formal opening session (Followed by a review of the administrative items)
10:30	BREAK
11:00	Course overview (Lee/Ting)
12:00	LUNCH
14:00	Film: "Introduction to modern information problems"
15:00	Introduction to information science: Past, present and future (Beckman)
15:30	BREAK
16:30	Question and answer session to identify and evaluate individual situations (All lecturers)

Tuesday, 7 December

08:30	Value of information (Ting)
10:00	BREAK
10:30	Continuation of lecture with defined specifics (Ting)
12:00	LUNCH
14:00	AGRIS: An international information system for agriculture science and technology (Lendvay)

15:30 BREAK

16:00 CODOC: An automated system for organizing government publications (Beckman)

Wednesday, 8 December

08:30 Application of new technology (Ting)

10:30 BREAK

11:00 Predecessors of modern computerized systems: Manual and semimechanical information systems (Lendvay)

12:00 LUNCH

14:00 On-line circulation system on minicomputer (Beckman)

Planning for library automation using MINISIS as an example (Broadbent/Ting)

Thursday, 9 December

08:30 Open forum on the main types of information centres: National, regional and international. (All lecturers)

International cooperation in information: The agricultural sector as an example (Broadbent)

Regional information services (slide presentation) (Broadbent)

Information for small-scale industry (slide presentation) (Broadbent)

Specialized Information Analysis Centres (Broadbent)

10:30 BREAK

11:00 Types of information centre: Special - An overview (Beckman)

Types of information centre: Regional - AGE and other regional information centres established by the Asian Institute of Technology, Bangkok, Thailand (Lee)

12:00 LUNCH

AFTERNOON - FREE

Friday, 10 December

08:30 Tools and services of information centres, with specific examples from CISTI (Beckman)

10:30 BREAK

11:00 How to manage and link all components together (Wills)

12:00 LUNCH

14:00 Star or distributed network (Beckman)

Discussion on coordination and networking: The Chinese case

15:30 BREAK

16:00 Scientific information exchange and transfer of technology: A review of the principles (Broadbent)

Saturday, 11 December

08:30 Organization and management of special libraries: Agriculture as an example (Lendvay)

10:00 BREAK

10:30 Management techniques: Operational examples (Wills)

Cost-effectiveness and cost-recovery in information service (Lee)

12:00 LUNCH

14:00 Organizational structures of information centres (Beckman)

15:30 BREAK

16:00 Institutional budgeting: Development, control, and review (Lee)

Monday, 13 December

08:30 User needs and user satisfaction (Wills)

10:00 BREAK

10:30 Improving bibliographic control from the national perspective (Lee)

12:00 LUNCH

14:00 Chinese input/output and processing (Ting)

15:30 BREAK

16:00 Questions and answers about the Ohio College Library Center (Lee)

Slides on CISTI building design (Beckman)

Tuesday, 14 December

08:30 Discussion group on information systems development: Project management (Ting)

10:00 BREAK

10:30 Discussion group on information systems development: Systems analysis and design (Ting)

12:00 LUNCH

AFTERNOON - FREE

Wednesday, 15 December

08:30 Information sources (Broadbent)

Information resources and how to use them effectively (Broadbent)

10:00 BREAK

10:30 Nonconventional information (Wills)

12:00 LUNCH

14:00 Nonconventional media and nonprint materials (Wills)

Slide presentation on micrographics (Wills)

15:30 BREAK

16:00 Computerized data bases: Bibliographic and nonbibliographic (Lee)

Thursday, 16 December

08:30 Case study presentations:
CISTI (Beckman)
ISTIY (Yu)

15:30 Panel discussion: The Chinese case

Friday, 17 December

08:30 Facility planning and management (Beckman)

10:00 BREAK

10:30 Performance evaluation (Lee)

12:00	LUNCH
14:00	Human resources development (Beckman)
15:30	BREAK
16:00	Staff development and continuing education (Lee)
17:00	Need for group evaluation (All lecturers)

Saturday, 18 December

08:30	Summary discussions (All lecturers)
10:00	BREAK
10:30	Group evaluation
12:00	LUNCH
14:00	Formal closure

APPENDIX 2. SPEECH AT THE OPENING CEREMONY

Mr Zhang Zhengbing, Deputy Director of ISTIC, Vice President, The Chinese Society for Scientific and Technical Information

Dear Friends and Comrades:

Today it is my great pleasure and honour to have the opportunity to give a speech on the opening ceremony of the Training Course on Management of Information Centres. First of all, on behalf of the Institute of Scientific and Technical Information of China (ISTIC), I would like to extend my warmest welcome to our Canadian friends from the International Development Research Centre (IDRC), as well as the professors and doctors from other countries.

Like most participants present here, I have been looking forward to this course for a long time and hoping to gain more knowledge on scientific and technical information management from you.

You all know there is a long traditional friendship between China and Canada. As an excellent example of this friendship, Dr Norman Bethune made light of traveling thousands of miles to help us in our liberation and died a martyr at his post in China. His great spirit has been and will always be inspiring for millions of Chinese people. The friendship and exchange between us have been steadily developed ever since diplomatic relations were formally established in 1970. Today, the opening of the course supported by IDRC is another example of this friendship and exchange.

In order to conduct this course successfully, Mr Broadbent and his colleagues, as well as all lecturers, have made detailed preparations and great efforts.

Taking this opportunity, in the name of ISTIC and all participants here, I would like to express my sincere thanks to all of you, and through you also to IDRC.

It is known that the Chinese people are now working hard for the achievement of the "Four Modernizations". Most recently, our government set a new grand goal: to quadruple the gross annual value of industrial and agricultural production by the year 2000. There is no doubt, scientific and technical information will play a very important role in the process of achieving this grand objective. Under these circumstances, we are eager to be informed and to learn more about information management and services.

The participants here come from information institutes in 24 provinces and municipalities, and 22 specialized information institutes that are attached to various ministries as well as other libraries and information institutes. Most of them are deputy directors and division chiefs of planning and management. I believe, through hard work and close cooperation between lecturers and participants, this course is bound to achieve better results.

Despite the fact that all possible efforts were made by our local hosts - the Institute of Scientific and Technical Information of Yunnan Province and ISTIC - there will be some defects in our preparation and some inconveniences that you will encounter during the course owing to our limited facilities. I would like to mention to our guests, please feel free to let us know and we will do our best to cooperate with you in solving any problems.

In conclusion, may I wish the training course complete success and all our foreign friends a happy stay in China. And I also hope that all participants will achieve good results in their studies!

Thank you.

APPENDIX 3. SECOND SPEECH AT THE OPENING CEREMONY

Mr Yu Futing, Vice Chairman, Scientific and Technical Commission of Yunnan Province

Ladies and Gentlemen, Comrades:

On behalf of the Yunnan Provincial Commission of Science and Technology, I express my best wishes and warm welcome to all information specialists, professors and friends from Canada, the United States and United Kingdom, who have traveled thousands of miles to come to China's Kunming City to attend lectures. I also warmly welcome all participants who are here to attend the Course on Management of Information Centres, jointly sponsored by the Institute for Scientific and Technical Information in China (ISTIC) and the International Development Research Centre (IDRC).

At present, people all over our country are working hard to create a new situation in all fields of socialist modernization. It is the necessity for our "Four Modernizations" to learn and to introduce the advanced science and technology and scientific management experiences from foreign countries. Therefore, to hold this nationwide course on the management of information centres is timely and necessary.

To develop science and technology, information work must be done first. At the same time, it is fundamental to build up effective information personnel forces. Special attention must be paid to train and create a fairly large number of comparatively high-level information managers with a mastery of information management knowledge, as well as the practical management experience to run the information institutes well. They can serve as competent "consultants" for the "Four Modernizations" and to extend better information service for the social and economic development of our country.

It is a very good learning opportunity for the Institute of Scientific and Technical Information of Yunnan Province to have this course held in Kunming, known as the Spring City. This course will surely promote the scientific and technical work and information work of our Province. We very much treasure this opportunity. We will earnestly learn about the experiences of information management and the management of information centres from all the instructors. The comrades from our Province will also take this opportunity to learn about the precious experiences of the fraternal institutes of different provinces, municipalities and specialized institutes of various ministries under the State Council so as to do better information work in our Province in the future.

We will do our best to assist ISTIC in running this course well, to provide instructors and trainees with better teaching, learning and living conditions, and to properly arrange a few recreation activities. However, at the moment, the conditions in Yunnan are limited. That might cause some inconvenience to our friends and comrades. If this happens, please do not hesitate to point it out. We will try our best to do all the work better.

Finally, I wish the Course on Management of Information Centres great success!

I wish all the ladies and gentlemen a happy stay in Kunming and good health!

I wish all the trainees good results in their course of study!

Thank you.

APPENDIX 4. MESSAGE FROM JOHN WOOLSTON

Director of Information Sciences Division, IDRC, Ottawa, Canada

The International Development Research Centre (IDRC) rejoices in the fact that, over the last 2 years, it has been able to build a program of cooperation with scientific and technical institutions in the People's Republic of China. This program has many facets, and it includes components in agriculture, forestry, fisheries, medicine and the social sciences. In IDRC's efforts to promote research in the developing countries, it must take account of the experience of the one-quarter of all mankind that lives and works in China. Your scientific tradition spans the centuries, while ours is of much more recent origin. Your culture and history teach you how to avoid mistakes which we, in our relative youth, may not even recognize.

Personally, I am much gratified by the cooperation that we have begun with the Institute for Scientific and Technical Information in China (ISTIC). I often remember the day in September 1981 when I was received at ISTIC by Dr Lin Zixin and his staff, and when I learned about the ambitious program undertaken by ISTIC to modernize the delivery of information throughout your country. In subsequent meetings in Beijing, we had our first exchange about the preparation of this course. I am glad that our plans are now becoming a reality, and I hope that all participants will find the course useful and beneficial.

Coordinated by my colleague in IDRC, Mr Kieran Broadbent, the team from North America has worked extremely hard to assemble appropriate material and to adapt it, as far as they can, to the situation that exists on your side of the Pacific Ocean. Some will address you directly in your own language, and the others through interpreters. I know that all of them are as anxious to learn as to teach. I share their hope that this will be a two-way exchange of experience so that, while you may learn something about the techniques now used in North America for the management and operation of information centres, we shall learn what your society is doing to maintain and strengthen the creative process.

APPENDIX 5. MR BROADBENT'S SPEECH AT THE OPENING CEREMONY

Dear Mr Zhang and Friends:

I think the Chinese jest puts it well: "You need be afraid of nothing except a foreigner speaking Chinese!" Forgive me if I now make terrible mistakes with your language, for I do not speak it very well.

Since I was quite small, I have been interested in China and the Chinese language. Therefore, I am particularly happy to come to Kunming at this time, because I am satisfying two objectives; I am so happy I cannot express myself fully.

I am also particularly happy to take part in this training seminar. Today, I am also very pleased to thank you, Mr Zhang, and all your comrades at the Institute for Scientific and Technical Information in China (ISTIC) who have helped arrange this course so well.

Although this course has been a long time in its planning and preparation, various members of the ISTIC staff and, I should add, staff members of your Embassy in Ottawa have all worked very hard to make it a success. I do not know how to thank you enough. In particular, Mr Liu Zhaodong has worked very closely with me all the time.

Now, first of all, I must say that the President of our Centre, Mr Ivan Head, sends you all his earnest wishes for the success of this course. He believes that Chinese-Canadian cooperation is increasingly important, especially from the scientific and technical point of view. Therefore, he places great emphasis on cooperation with ISTIC in this area, so that our two institutions can work together to raise the standards of library and information science in China. He recognizes ISTIC as an important institution in this respect. The International Development Research Centre (IDRC) also is unique in that it places great emphasis on information science by having one division devoted to supporting information science activities. Therefore, ISTIC-IDRC cooperation is doubly important.

At this point, I ought to say a little about the theme of this course, the main aspect of which is to give everyone a basic introduction to modern methods on library and information science. Originally, my institution, IDRC, wanted to conduct this course with all Chinese-speaking lecturers, but we soon found this was not possible. However, we have been able to compromise by having two Chinese native speakers. The first is Dr T.C. Ting of Worcester College, Massachusetts, where he teaches computer science. Previously he was with the National Bureau of Standards in Washington, DC. He has been to China many times before. The second lecturer is Dr Hwa-Wei Lee, who is Head of Libraries at Ohio State University and was formerly at the Asian Institute of Technology in Thailand.

Our Canadian delegation is headed by Mrs Margaret Beckman. She is in charge of the Library at the University of Guelph. From England, we have Mr Brian Wills. He has worked at many international institutes, in particular in Africa and the U.K. He is currently at the International Crops Research Institute for the Semi-Arid Tropics in India. Miss Olga Lendvay is a member of the IDRC staff, responsible for training coordination in the Information Sciences Division.

The theme of this course is practical management. This is important in order to maintain good quality services in library and information activities. Every year there are advances in science and technology; social and economic progress depends on there being good communication and the exchange of new ideas. As knowledge increases, so should our ability to communicate with one another.

Libraries and information centres are increasingly being used by all levels of scientific and technical society; in order to cope with demands for services, we need to build effective services to collect, process and disseminate information. There have been many rapid innovations in the handling of information, especially in the use of computers. We all recognize that information work is no longer easy work - handling various kinds of documents, patents, books of all kinds and journal articles.

It is our hope that, with this course, we can bring some fresh ideas to you all on these problems. Of course, in organizing a course of this kind, it is not easy because we are not too familiar with all your problems. I therefore urge you to come forward and tell us what deficiencies there are and offer criticisms so that we may improve the course content as we go along. We are here to serve you.

Finally, may I say on behalf of all the lecturers and myself that we welcome you all and hope we can all cooperate together.

Thank you.

APPENDIX 6. MR BROADBENT'S ADDRESS TO THE CLOSING SESSION

This course is now completed. We teachers are grateful to you all for your participation and attentiveness. We could not have had a better audience. In fact, without your criticisms and suggestions, we could not have known our own deficiencies - you have helped make this course better.

When I was first asked by Mr Woolston to organize this course, I took on the task with some trepidation. How could I organize a course that would be acceptable to conditions in China? The Chinese proverb summed up my dilemma well - I felt like "a blind man riding a blind horse", but I had the support of all the lecturers here and of the Institute of Scientific and Technical Information of China (ISTIC). I must say, the lecturers and our secretaries have all worked well and have tried to adapt to your needs, and I would like to thank them all now. Dr Ting has unfortunately had to leave already and cannot be here with us today for the closing ceremony because of work pressures in his own university. He made a particularly excellent effort, sometimes helping us in our own lectures. We can see he likes to teach. Perhaps we should change his name to "Mr Can't-stop-teaching". We have all enjoyed the experience and can only hope that what we have given you in these last 2 weeks has been useful to you and will help you in your own work. In the long term, we hope it will also help raise the overall level of knowledge of modern management in your country.

In accordance with your national policy to raise the standards of science and technology, this course must be important because information exchange is the foundation of research and development. New techniques need to be understood by those who have to implement them and also need to be quickly disseminated. We have tried to give some idea of the latest foreign experiences in this respect, but inevitably we cannot hope to cover all areas of interest. This course, therefore, must be regarded as a fundamental introduction to the subject, a starting point.

You should therefore try to use it as something to build on and adapt to your own conditions. Finally, I would like to say that the International Development Research Centre (IDRC) does not see this course as an end in itself, but as the beginning of a dialogue between us. Please feel free to write to us at IDRC and we will try to answer your questions.

It now remains for me to thank Mr Lin Zixin, Director of ISTIC, Deputy Director Mr Zhang Zhengbing, Mr Liu Zhaodong and all his staff both here and in Beijing, who have made this course possible. They have all worked very hard, often late at night, translating documents. I cannot thank them enough.

I would also like to thank the Provincial Governor and local representatives for providing such hospitable conditions. Kunming is very pleasant, the people are very friendly. We have been very happy here and have made lots of friends. I would also like to thank the Manager of the Green Lake Hotel for making our stay comfortable and for providing space for the seminar and putting up with all our problems.

Finally, a hearty thanks to you all. We met as strangers and leave as friends. I wish you all a safe journey to your homes. Long live the friendly cooperation between our two countries.

APPENDIX 7. CLOSING SPEECH BY MR LIU ZHAODONG

Dear Friends, Comrades:

Today is a red-letter day for all of us. The Training Course on Management of Information Centres jointly sponsored by the International Development Research Centre (IDRC) and the Institute of Scientific and Technical Information of China (ISTIC) has successfully been completed. During the 2-week period of the course, Mr Broadbent and all the information specialists present here have tried their best and done industrious work. They have comprehensively and systematically introduced updated information from Canada and the United States, as well as international information systems on information theory, information management and the application of new information technology, which aroused great interest in all participants.

Participants have come from all over the country. Although from geographically varied areas, they have one thing in common - they all have gained a lot from the course. We believe that they will apply the knowledge they have received from the course to their own institutions. This course will surely be a catalyst for the development of information work in our country.

In the past year or so, Mr Broadbent and all the specialists here have carefully organized and prepared for the course and have therefore made it a good one. Now allow me, on behalf of Director Lin Zixin and Deputy Director Zhang Zhengbing of ISTIC, all trainees and all members of the working staff here, to express our heartfelt thanks to our foreign friends, and to IDRC and Mr Woolston.

As you all know, the Chinese people are working hard to achieve the grand goal of quadrupling the gross annual value of industrial and agricultural production by the end of this century. In the recently published National Economic Development Sixth Five-year Plan, science and technology has a significant place. After 5 years' effort, the gap between China and the world's advanced level in some major scientific and technological areas must be shortened, and productive technologies for the development of the national economy should be enhanced.

The Five-year Plan emphatically pointed out that it is necessary to introduce, collect, compile, photocopy and report the domestic and foreign literatures, to strengthen the exchange of internal information, and gradually to establish a scientific and technical information system that will be suitable to Chinese conditions. This not only shows clearly the objectives for us, but also demonstrates that China's scientific and technical information circles have broad prospects with IDRC and other international organizations in scientific and technological cooperation. I hope in the future that we will have more opportunities for all-round cooperation either with IDRC or with the friends here. I also hope our friends can frequently come to China to present lectures or just for touring.

Finally, I especially want to say that the course has received great support from the Government of Yunnan Province and the Yunnan Provincial Commission of Science and Technology. The leading cadres and many warm-hearted comrades of the Yunnan Information Institute have done a lot regarding the teaching work, as well as other arrangements. On behalf of ISTIC, all staff from ISTIC and all participants here, I express our gratitude to all our comrades from the Yunnan Information Institute.

After the course, all you friends and comrades will return to your working posts. I wish you all good health and a pleasant journey. I understand that Christmas is coming: therefore, may I wish you in advance a happy reunion with your families.

Thank you for your attention.

APPENDIX 8. LIST OF PARTICIPANTS

Yang Zonglie, Deputy Director, Institute of Scientific and Technical Information of Hunan Province

Liang Defeng, Head of Section, Institute of Scientific and Technical Information of Heibei Province

Bao Changhuo, Head of Section, North Institute for Scientific and Technical Information

Liu Shumei, Deputy Director, Scientific and Technical Information Research Institute, Ministry of Textile Industry

Yao Lingzhi, Deputy Chief, Institute of Scientific and Technical Information of Beijing

Wang Yuliang, Head of Office, Institute of Scientific and Technical Information of Shanghai

Cao Huimin, Deputy Director, Institute of Scientific and Technical Information of Tianjin

Zhu Lanwei, Engineer, Institute of Scientific and Technical Information of Beijing

Wei Yunrui, Director, Institute of Scientific and Technical Information of Heibei Province

Li Chunyi, Assistant Researcher, Institute of Scientific and Technical Information of Hei Longjiang Province

Yu Deqian, Deputy Section Chief, Institute of Scientific and Technical Information of Jilin Province

Wang Yusong, Director, Institute of Scientific and Technical Information of Shanxi Province

Miao Xi, Head of Section, Institute of Scientific and Technical Information of Shandong Province

Zhu Xiouchou, Assistant Engineer, Institute of Scientific and Technical Information of Anhui Province

Zhou Zhuying, Director, Institute of Scientific and Technical Information of Fujian Province

Zhou Qi, Deputy Director, Institute of Scientific and Technical Information of Hunan Province

Xie Chuanlan, Head of Section, Institute of Scientific and Technical Information of Heibei Province

Liu Guanhua, Lecturer, Institute of Scientific and Technical Information of Guangdong Province

Zhou Xia, Deputy Director, Institute of Scientific and Technical Information of Zhejiang Province

Tian Xinnian, Deputy Director, Institute of Scientific and Technical Information of Shan'xi Province

Liu Jianhuan, Deputy Director, Institute of Scientific and Technical Information of Guangxi Autonomous Region

Xing Dinghuan, Deputy Director, Institute of Scientific and Technical Information of Ningxia Hui Autonomous Region

Duan Ying, Deputy Director, Institute of Scientific and Technical Information of Xinjiang Autonomous Region

Zhang Xianda, Deputy Director, Institute of Scientific and Technical Information of Sichuan Province

Ding Qingsheng, Assistant Researcher, Institute of Scientific and Technical Information of Guizhou Province

Yu Dingqing, Director, Institute of Scientific and Technical Information of Yunnan Province

Sheng Shixiong, Deputy Director, Institute of Scientific and Technical Information of Yunnan Province

Li Yigan, Deputy Section Chief, Institute of Scientific and Technical Information of Yunnan Province

Liu Zhongda, Deputy Director, Institute of Scientific and Technical Information of Liaoning Province

Li Lingjia, Technician, Scientific and Technical Information Institute, Machine Building Ministry

Yu Fuzhong, Head of Office, Institute Service Department of Petroleum Society

Pan Yuman, Deputy Chief Engineer, Institute of Scientific and Technical Information, Ministry of Chemical Industry

Min Yaoxing, Deputy Chief, Library of Scientific and Technical Information, Research Institute of Railways, Ministry of Railways of China

Ke Xianzhu, Chief, Documentation Division, Institute of Scientific and Technical Information, Ministry of Communications

Lin Minghua, Deputy Director, Information Institute of Science and Technology, Ministry of Water Resources and Electric Power

Diao Zhengyan, Deputy Head, Operational Division, Institute of Information, Chinese Academy of Building Research

Rong Peikang, Engineer, Research Institute of Technical Information and Standardization for Building Materials

Wang Shuzhen, Engineer, Technical Information Centre, Ministry of Metallurgical Industry

Tang Jiuxu, Deputy Director, Technical Information Centre, Ministry of Post and Telecommunications

Rui Shusheng, Director, Information Institute of Coal

Science and Technology, Ministry of Coal Industry

Hou Lian De, Assistant Researcher, Information Institute of Agricultural Science and Technology, Chinese Academy of Agricultural Science

Chen Ruping, Deputy Section Chief, Institute of Scientific and Technical Information, Chinese Academy of Forestry

Ye Youyi, Engineer, Institute of Scientific and Technical Information, Ministry of Light Industry

Sun Zhihuai, Head of Office, Institute of Scientific and Technical Information, Ministry of Nuclear Industry

Zhang Zhiping, Editor-in-Chief, Aircraft Production Engineering, Beijing

Zhao Xucai, Researcher, Institute of Marine Scientific and Technological Information, National Bureau of Oceanography, Tianjin

Xue Lianda, Researcher, Information Service Centre, National Bureau of Meteorology

Li I-ti, Head, Science and Technology Reference Section, National Library of China

Qin Tiehui, Lecturer, Library Science Department, Beijing University

Yan Yimin, Associate Professor, Library Science Department, Wuhan University

Cheng Deyang, Assistant Researcher and Fellow Editor, Journal of Information Science, Institute of Scientific and Technical Information of China, Beijing

Chen Ke, Deputy Chief, Planning and Operating Division, Institute of Scientific and Technical Information of Chongqing Province

Meng Jianmin, Responsible Member of Library, China Population Information Centre

Li Xiang, Engineer, Institute of Scientific and Technical Information of China

Zhai Yun, Head of References, Intitute of Scientific and Technical Information of China

Chen Xiaoshan, Assistant Researcher, Library of Nankai University

APPENDIX 9. LIST OF LECTURERS AND IDRC PERSONNEL

Lecturers

Margaret Beckman, Chief Librarian, University of Guelph

Hwa-Wei Lee, Director of Libraries, Ohio University

T.C. Ting, Department of Computer Science, Worcester Polytechnic Institute

J. Brian Wills, Information Services Unit, International Crops Research Institute for the Semi-Arid Tropics

IDRC Personnel

Kieran P. Broadbent, Course Administrator

Olga Lendvay, Coordinator

Sally Tan, Secretary

Olive Charnell, Secretary

Special thanks are extended to Liu Dong Sheng, Second Secretary, Embassy of the People's Republic of China, Ottawa.

APPENDIX 10. LIST OF CHINESE STAFF MEMBERS

Chao Yungan, Head of Course Administration (Director of the 2nd Division Operations, ISTIC)

Liu Zhaodong, Deputy Head of Course Administration; in charge of training programs and liaison work (Deputy Director, Division of International Relations and Cooperation, ISTIC)

Li Zhaoying, Deputy Head of Course Administration; in charge of secretarial services (Deputy Director, ISTIY)

Zhao Dihan, ISTIC staff member for training programs of the course

Zhou Shusen, ISTIC support staff member

Zhao Yingfu, Interpreter

Huang Jianyuan, Interpreter

Zhao Yangling, Interpreter/liaison person for IDRC secretaries and lecturers

APPENDIX 11. BASIC QUESTIONNAIRE - CHINESE

“情报中心管理培训班”

基本问答卷

姓名（拼音）______________________ 姓名（中文）__________

所属单位 ________________________ 地址 ________________

____

职位 ____

一般资历 ____

图书馆及情报处理方面的经验 ____________________________

____

____

____

英文程度： 好 □ 尚可 □ 全无 □

其它语文程度·请说明 ___________________________________

您希望在本次培训班获得什么？

1、增进科技情报工作的基本技能 □

2、对工作的缓急次序有较佳认识 □

3、对某些情报科学方面的问题作进一步探讨 □

4·获得将来继续加强训练的基础 □

5、获得管理科学技术某一方面的知识

请说明 ______________________________

6、加强其它方面的知识

请说明 ______________________________

7、您对我们安排的课程中的那一部份最感兴趣 ____________

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您是否曾在工作上遇到过下列问题，而希望在培训班上获得解答。

1·工作的目标和概念模糊不清 是 □ 否 □

2、次序有冲突，不能把时间及工作的轻重先后作适当的分配 是 □ 否 □

3·未能与侨胞科技情报的专业人员有充分的接触与了解 是 □ 否 □

4、难以取得文件和资料 是 □ 否 □

5、没有足够的空间来收藏文件资料 是 □ 否 □

6、一般来讲，没有适当的工作环境 是 □ 否 □

7、您的作业没有一个固定的预算及良好的财务制度是 □ 否 □

8、不知到那儿去找人指导和改良服务 是 □ 否 □

9、与别的情报资料中心缺乏联系 是 □ 否 □

10、设备采购及使用的问题 是 □ 否 □

11、没有接受进一步训练的机会 是 □ 否 □

12、与专业同事缺少接触 是 □ 否 □

13、人才的选拔、应用及考核问题 是 □ 否 □

14、新技术的引用及发展方面的问题 是 □ 否 □

15、您是否有某一项问题，希望能在这课程里，有机会讨论? 是 □ 否 □

请说明 ____________________

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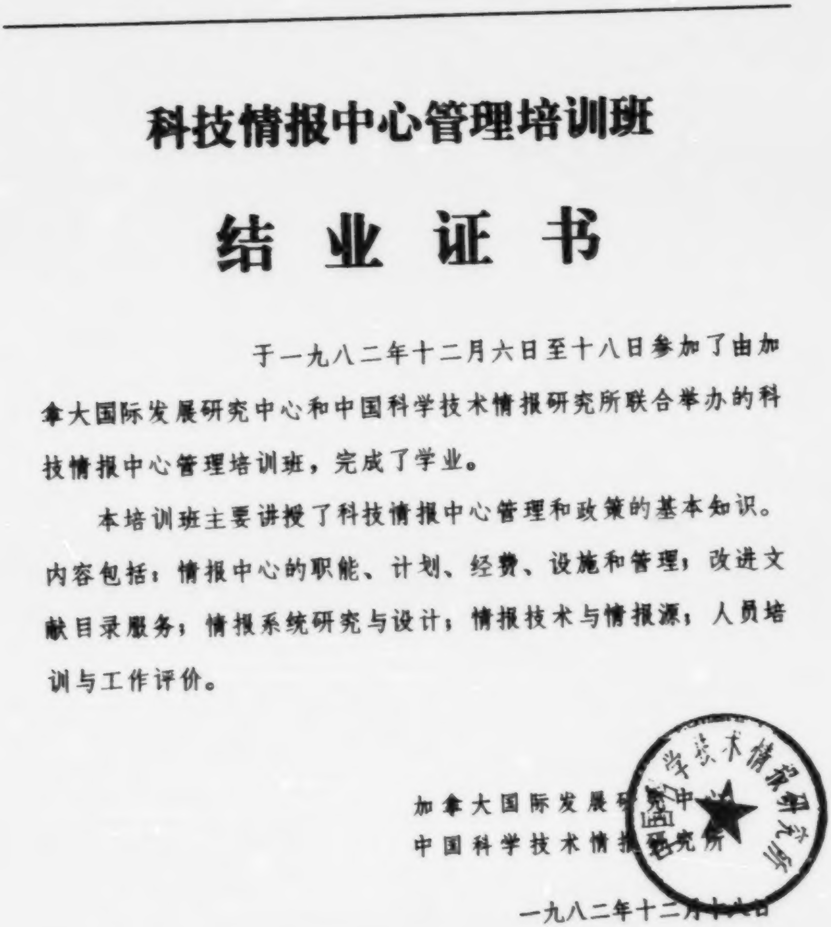
APPENDIX 12. CERTIFICATES PRESENTED TO PARTICIPANTS



科技情报中心管理培训班

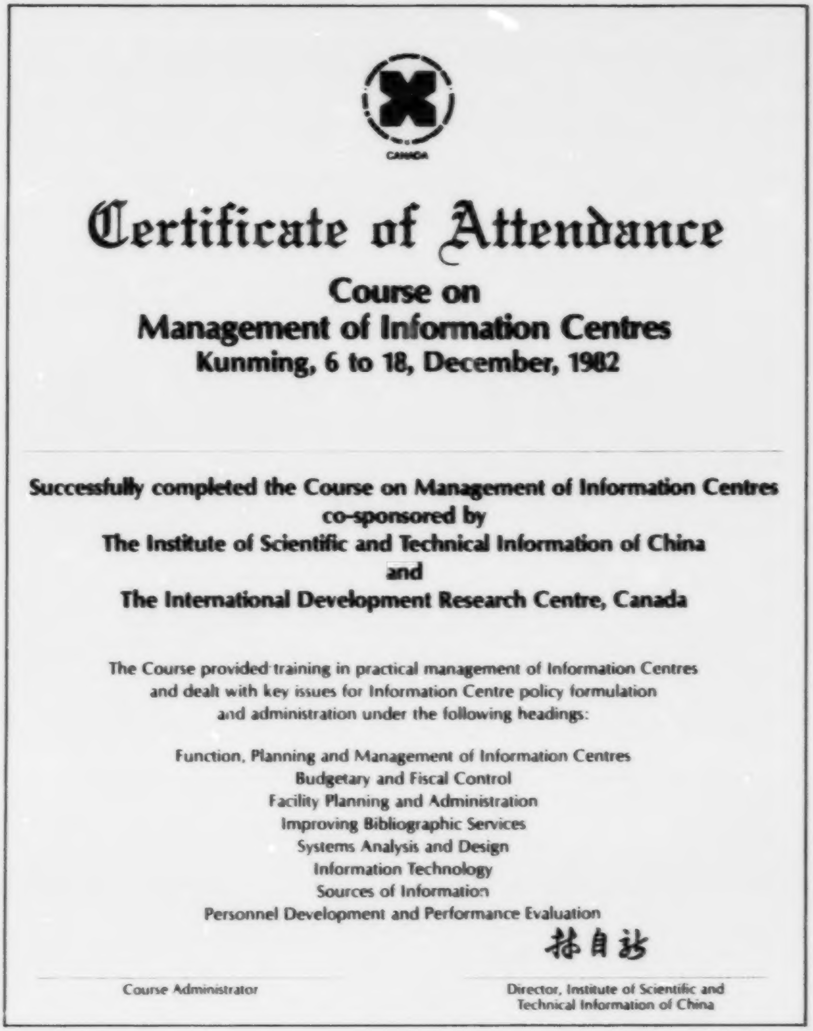
结业证书

于一九八二年十二月六日至十八日参加了由加拿大国际发展研究中心和中国科学技术情报研究所联合举办的科技情报中心管理培训班，完成了学业。

本培训班主要讲授了科技情报中心管理和政策的基本知识。内容包括：情报中心的职能、计划、经费、设施和管理；改进文献目录服务；情报系统研究与设计；情报技术与情报源；人员培训与工作评价。

加拿大国际发展研究中心
中国科学技术情报研究所

一九八二年十二月十八日
——昆明——



Certificate of Attendance

Course on
Management of Information Centres
Kunming, 6 to 18, December, 1982

Successfully completed the Course on Management of Information Centres
co-sponsored by
The Institute of Scientific and Technical Information of China
and
The International Development Research Centre, Canada

The Course provided training in practical management of Information Centres
and dealt with key issues for Information Centre policy formulation
and administration under the following headings:

Function, Planning and Management of Information Centres
Budgetary and Fiscal Control
Facility Planning and Administration
Improving Bibliographic Services
Systems Analysis and Design
Information Technology
Sources of Information
Personnel Development and Performance Evaluation

林自新

Course Administrator

Director, Institute of Scientific and
Technical Information of China

APPENDIX 13. BIBLIOGRAPHY ON GENERAL ASPECTS OF INFORMATION SCIENCES

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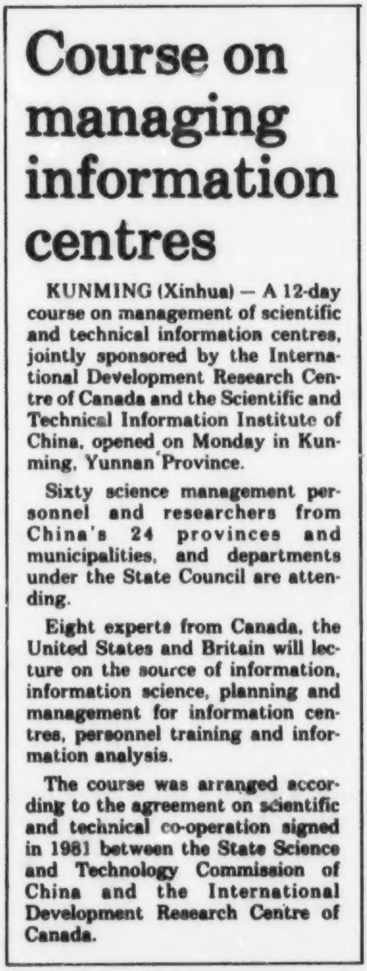
APPENDIX 14. ITEM IN CHINA DAILY, 9 DECEMBER 1982



Course on managing information centres

KUNMING (Xinhua) — A 12-day course on management of scientific and technical information centres, jointly sponsored by the International Development Research Centre of Canada and the Scientific and Technical Information Institute of China, opened on Monday in Kunming, Yunnan Province.

Sixty science management personnel and researchers from China's 24 provinces and municipalities, and departments under the State Council are attending.

Eight experts from Canada, the United States and Britain will lecture on the source of information, information science, planning and management for information centres, personnel training and information analysis.

The course was arranged according to the agreement on scientific and technical co-operation signed in 1981 between the State Science and Technology Commission of China and the International Development Research Centre of Canada.

APPENDIX 15. DEFINITIONS AND EXPLANATIONS

AN ANALYSIS CENTRE is an organization that indexes, abstracts, translates, reviews, synthesizes and evaluates information and data in a clearly defined specialized field or pertaining to a special mission; it then provides specific user groups with digested, repackaged or otherwise organized pertinent information.

A CLEARINGHOUSE is an organization that collects and maintains records of research, development and engineering that is either being planned, currently in progress, or completed. It provides documents derived from these activities, and provides referral services to other sources for information related to these activities.

A DOCUMENT CENTRE is an organization that has fewer functions than a documentation centre - i.e., selecting, acquiring, storing and retrieving specific documents. Such a centre disseminates the documents delivered to it, or facsimiles of them; other processes such as indexing, abstracting and extracting are carried out at a documentation centre or an analysis centre.

A DOCUMENTATION CENTRE is a place where publications (primarily of a nonbook format) are received, processed, preserved, annotated and indexed, and bibliographies prepared according to subject, author or region.

AN INFORMATION CENTRE is difficult to precisely define because the concept has been changing. The tremendous increase in scientific research and development has demanded expanded, more efficient and better integrated services. The result has been a trend to unify library, translation, report writing, archival, abstracting, literature research, editorial, communication and publication activities within a single facility. The centralization of all, some or only two or three of these activities has at times been called an information centre. Some information centres offer additional services, such as providing replies to queries, retrospective searches and selective dissemination of information. To satisfy requests for information on specific subjects, these centres often use the services of other libraries, documentation centres, analysis centres, subject specialists, and other sources.

AN INFORMATION CLEARINGHOUSE is a name sometimes given to a special library possessing a limited amount of published material, but which collects and gives information by telephone, correspondence and through other libraries.

AN INFORMATION NETWORK is a system that integrates institutions - libraries, documentation centres, information centres, and analysis centres - into a coordinated whole, to provide a community of users with relevant input data, irrespective of its origin, format or physical location. An information network can be subject- or mission-oriented.

A NATIONAL INFORMATION NETWORK is an information network that coordinates the information facilities of a country.

A NATIONAL INFORMATION SYSTEM is a system that plans and coordinates the national information network, and ties it with research and development institutes, specialists and pertinent organizations abroad, to provide relevant services to users in a country.

A PUBLIC LIBRARY serves the population of a community free of charge or for a nominal fee, and is financed either by a public authority or through private sources. It can serve either the general public or special categories of it, such as children, hospital patients, prisoners and employees of particular organizations. It is used primarily for recreation and self-improvement.

A REFERRAL CENTRE is an organization that directs researchers of information and data to appropriate sources, such as libraries, analysis centres, document or documentation centres, and individuals. A referral centre does not supply data or documents.

A SPECIAL LIBRARY is devoted to a special subject or mission. It offers specialized information services to a specialized clientele and is maintained by a professional association, government agency, research institution, learned society, museum, business or industrial enterprise.

A SPECIALIZED INFORMATION CENTRE is part of an organization engaged in research or dealing with a specific subject. It can be a small unit or a large, more independent body. Its main function is to collect information on the specialty and disseminate it among the staff of the organization and researchers of other institutions working in the same subject. It usually indexes, abstracts and digests information, and keeps in contact with libraries, documentation centres, etc., for current awareness, the collection of new publications and cooperation in other areas.

APPENDIX 16. LIST OF ACRONYMS

AACR	Anglo-American cataloging rules (ALA, CLA, LA)[1]
AGE	Asian Information Center for Geotechnical Engineering, Bangkok, Thailand (AIT)
AGRIS	International Information System for the Agricultural Sciences and Technology, Rome, Italy (FAO)
AIBA	Agricultural Information Bank for Asia, Los Baños, Philippines
AID	Agency for International Development, Washington, DC, USA
AIT	Asian Institute of Technology, Bangkok, Thailand
ALA	American Library Association, Chicago, IL, USA.
AMIC	Asian Mass Communication Research and Information Centre, Singapore
APIC	Asian Packaging Information Centre, Kowloon, Hong Kong
ARL	Association of Research Libraries, Washington, DC, USA
ASFA	Aquatic Sciences and Fisheries Abstracts (FAO)

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[1] Acronym in parentheses is parent organization.

ASFIS	Aquatic Sciences and Fisheries Information System (FAO)
ASI	American Society of Indexers, New York, NY, USA.
ASIDIC	Association of Information and Dissemination Centers, Athens, GA, USA
ASIS	American Society for Information Science, Washington, DC, USA
ASLIB	Association of Special Libraries and Information Bureaux, London, U.K.
BIOSIS	Biosciences Information Services, Philadelphia, PA, USA (Biological Abstracts)
BIOTROP	Regional Center for Tropical Biology, Bogor, Indonesia (SEAMEO)
BL	British Library, London, U.K.
BLAISE	British Library Automated Information Service, London, U.K. (BL)
BLLD	British Library Lending Division, Boston Spa, U.K. (BL)
BNIST	Bureau national de l'information scientifique et technique, Paris, France
BRS	Bibliographic Retrieval Services, Scotia, NY, USA
CAB	Commonwealth Agricultural Bureaux, Farnham Royal, U.K.
CA CONDENSATES	Chemical Abstracts Tape Service
CAIN	Cataloguing and Indexing Systems (NAL)
CAIS	Canadian Association for Information Science, Ottawa, Ont., Canada

CAN/DOC	Canadian document delivery system (CISTI)
CAN/OLE	Canadian on-line enquiring (CISTI)
CAN/SID	Canadian Selective Dissemination of Information (CISTI)
CAR	Computer-assisted retrieval
CARIS	Current Agricultural Research Information System (FAO)
CASLIS	Canadian Association of Special Libraries and Information Services, Ottawa, Ont., Canada (CLA)
CCCII	Chinese character code of information interchange
CEAS	Cooperative Educational Abstracting Service (UNESCO)
CELADE	Centro Latinoamericano de Demografía, Santiago, Chile
CGIAR	Consultative Group on International Agricultural Research, Washington, DC, USA (FAO, IBRD, UNDP)
CIAT	Centro Internacional de Agricultura Tropical, Cali, Colombia
CIDA	Canadian International Development Agency, Ottawa, Ont., Canada
CIDIA	Centro Interamericano de Documentación e Información Agrícola, San José, Costa Rica (IICA)
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo, Ciudad de Mexico, Mexico
CIP	Cataloging in Publication
CISTI	Canada Institute for Scientific and

	Technical Information, Ottawa, Ont., Canada
CLA	Canadian Library Association, Ottawa, Ont., Canada
CODASYL	Committee of the Conference on Data Systems Language
CODATA	Committee on Data for Science and Technology, Paris, France (ICSU)
CODOC	Cooperative Documents System, Toronto, Ont., Canada
CO/MARC	Cooperative System for Cataloging North American Books
COMPENDEX	Computerized Engineering Index
CONSAL	Conference of South East Asian Librarians, Singapore
CONSER	Conversion of Serials Cooperative Project
CORE	Common Register of Development Projects (UN)
COU	Council of Ontario Universities, Toronto, Ont., Canada
CPU	Central processing unit
CRT	Cathode ray tube
CSIRO	Commonwealth Scientific and Industrial Research Organization, Melbourne, Australia
CUSO	Canadian University Service Overseas, Ottawa, Ont., Canada
CUSS	Cooperative Union Serials System
DAIRS	Data Access Information Retrieval System

DARE	Data Retrieval System for the Social Sciences (UNESCO)
DBMS	Data base management system
DEVSIS	Development Sciences Information System (IDRC)
DIALOG	Registered trade mark of Lockheed Information Systems on-line information retrieval system
DOBIS	Dortmunder Bibliothekssystem
DOCPAL	Sistema de Documentación sobre Población en América Latina, Santiago, Chile (CELADE)
DOS/VS	Disk operating system/Vertical storage
EEZ	Exclusive economic zone
ENSIC	Environmental Sanitation Information Center, Bangkok, Thailand (AIT)
ERIC	Educational Resources Information Center, Washington, DC, USA
ESCAP	Economic and Social Commission for Asia and the Pacific, Bangkok, Thailand (UN)
FAO	Food and Agriculture Organization of the United Nations, Rome, Italy
FID	Fédération internationale de documentation, La Haye, Pays-Bas
FIEWS	Food Information and Early Warning System (FAO)
GERDAT	Groupement d'études et de recherches pour le développement de l'agronomie tropicale, Paris, France
ICA	International Council on Archives, Paris, France

ICARDA	International Center for Agricultural Research in the Dry Areas, Beirut, Lebanon
ICIC	International Copyright Information Centre, Paris, France (UNESCO)
ICIPE	International Centre of Insect Physiology and Ecology, Nairobi, Kenya
ICRAF	International Council for Research in Agroforestry, Nairobi, Kenya
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, India
ICSU	International Council of Scientific Unions, Paris, France
IDRC	International Development Research Centre, Ottawa, Ont., Canada
IEE	Institute of Electrical Engineers, London, U.K.
IFIC	International Ferrocement Information Center, Bangkok, Thailand
IFIP	International Federation for Information Procession, Geneva, Switzerland
IFIS	International Food Information Service, Shinfield, U.K.
IFLA	International Federation of Library Associations and Institutions, The Hague, Netherlands
IFPRI	International Food Policy Research Institute, Washington, DC, USA
IGLIC	International Grain Legume Information Centre, Ibadan, Nigeria
IICA	Instituto Interamericano de Ciencias Agrícolas, San José, Costa Rica

IIIC	International Irrigation Information Centre, Bet Dagan, Israel
IITA	International Institute of Tropical Agriculture, Ibadan, Nigeria
ILCA	International Livestock Centre for Africa, Addis Ababa, Ethiopia
ILL	Interlibrary lending
ILO	International Labour Organisation, Geneva, Switzerland
ILRAD	International Laboratory for Research on Aminal Diseases, Nairobi, Kenya
INET	intelligent network
INFOTERM	International Information Centre for Terminology, Vienna, Austria (UNESCO)
INIS	International Nuclear Information System, Vienna, Austria (IAEA)
INSPEC	Information Services for the Physics and Engineering Communities, London, U.K. (IEE)
IOB	Inter-Organization Board for Information Systems and Related Activities, Geneva, Switzerland (UN)
IOC	Intergovernmental Oceanographic Commission, Paris, France (UNESCO)
IPPF	International Planned Parenthood Federation, London, U.K.
IRRI	International Rice Research Institute, Los Baños, Philippines
ISBD	International Standard Bibliographic Description

ISBN	International Standard Book Number
ISDS	International Serials Data Systems, Paris, France
ISI	Institute for Scientific Information, Philadelphia, PA, USA
ISIS	Integrated Set of Information Systems (ILO)
ISO	International Organization for Standardization, Geneva, Switzerland
ISSN	International Standard Serial Number
ITU	International Telecommunication Union, Geneva, Switzerland (UN)
IUCN	International Union for Conservation of Nature and Natural Resources, Morges, Switzerland
KWIC	Keyword-in-context
KWOC	Keyword-out-of-context
LA	Library Association, London, U.K.
LCC	Library of Congress Classification
MARC	Machine-Readable Catalogs (Library of Congress)
MEDLARS	Medical Literature Analysis and Retrieval System (NLM)
MEDLINE	MEDLARS-on-line
MERLIN	Machine-readable library information
MESH	Medical subject heading
MINISIS	Interactive Minicomputer System for Information Retrieval and Library Management (IDRC)

MODEM	Modular/demodulater
NAL	National Agricultural Library, Bethesda, MD, USA
n.a.s.f.	net assignable square feet
NATIS	National Information System (UNESCO)
NFAIS	Federation of Abstracting and Indexing Services, Philadelphia, PA, USA
NLM	National Library of Medicine, Bethesda, MD, USA
NTIS	National Technical Information Service, Springfield, VA, USA
OCLC	Ohio College Library Center
OCR	Optical character recognition
OCS	Optical coincidence system
OCUL	Ontario Council of University Libraries, Toronto, Ont., Canada
OR	Operations research
ORBIT	On-line retrieval of bibliographic information time-shared
OS	operating system
PERT	Program Evaluation Review Technique
POPIN	Population Information Network (UN)
PRECIS	Preserved Context Indexing System
PUDOC	Publications Documentation (Holland)
PWB	Program of work and budget
RAM	Ramdom access memory

RERIC	Renewable Energy Resources Information Center, Bangkok, Thailand (AIT)
RLG	Research Library Group
RLIN	Research Libraries Information Network
RTI	Royal Tropical Institute, Amsterdam, Netherlands
SCI	Science Citation Index
SDC	System Development Corporation, Santa Monica, CA, USA
SDI	Selective dissemination of information
SEAFDEC	Southeast Asian Fisheries Development Center, Iloilo, Philippines
SEAMEO	Southeast Asian Ministers of Education Organization, Bangkok, Thailand
SEARCA	Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Baños, Philippines
SERLINE	Serials on line, U.S. National Library of Medicine
SIAC	Specialized information analysis centre
SID	Society for International Development, Rome, Italy
SIN	Serial Identification Number
SLA	Special Libraries Association, New York, NY, USA
SMIC	Sorghums and Millets Information Centre, Hyderabad, India (ICRISAT)
SPINES	Sciences and Technology Policy Information Exchange System (UNESCO)

SSIE	Smithsonian Science Information Exchange, Washington, DC, USA
STAIRS	Storage and Information Retrieval System
STI	Scientific and technical information
TAC	Technical Advisory Committee (CGIAR)
TAXIR	Taxonomic Information Retrieval (FAO)
TECHNONET-ASIA	Asian Network for Industrial Technology Information and Extension, Singapore
UBC	Universal Bibliographic Control
UDC	Universal Decimal Classification
ULSS	Union List of Scientific Serials
UNBIS	United Nations Bibliographic Information System, New York, NY, USA
UNI MARC	Universial MARC
UNISIST	World Information System for Science and Technology, Paris, France (UNESCO)
USBE	United States Book Exchange
UTLAS	University of Toronto Library Automated System, Toronto, Ont., Canada
WIPO	World Intellectual Property Organization, Geneva, Switzerland (UN)
WLM	Washington Library Network, Washington, DC, USA
WMO	World Meteorological Organization, Geneva, Switzerland (UN)